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ABSTRACT

Online searches of bibliographic databases were conducted for scientists and technologists in one academic and one industrial setting. In order to determine the effect of this new technological development on its users' information-seeking habits, and to determine how, how often, and with what satisfaction online search services are used, records of use were maintained, and both users and nonusers of the online search service in the two environments were surveyed prior to the start and at the conclusion of the project's first phase. In the first phase, free, mediated (searched by information specialists) search service was provided; in the second phase, mediated search service at half the computer connect and offline printing costs was provided; and in the third phase, free searches were conducted by final user of the information. No striking change in information style that held true for both settings could be identified. Data on over 900 uses of online search service by almost 200 users are broken down and analyzed by such factors as information sources used prior to requesting online search service, amount of negotiation time required, number of non-retrieved relevant documents, and user satisfaction with currency, size, and utility of search output. (Author/JD)

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THE EFFECT OF ON-LINE SEARCH SERVICES ON CHEMISTS' INFORMATION STYLE

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ABSTRACT

Online searches of bibliographic data bases were conducted for scientists and technologists in one academic and one industrial setting. In order to determine the effect of this new technological development on its users' information style, and to determine how, how often, and with what satisfaction online search services are used, records of use were maintained and users as well as nonusers of the online search service in the two environments were surveyed prior to the start and at the conclusion of the first phase of the search service.

In the first phase of the Project, free and mediated (searched by information specialists) search service was provided. In the second phase, mediated search service at half the computer connect and offline printing costs was provided. In the third phase, free, non-mediated (searches conducted by final user of information) search service was provided.

No striking change in information style that held true for both settings could be identified. Records of over 900 uses of online search service by almost 200 users are characterized by factors such as information sources used prior to requesting online search service, amount of negotiation time required, number of non-retrieved relevant documents, and user satisfaction with currency, size, and utility of search output.

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PREFACE

We would like to acknowledge the contribution of a number of individuals who have made this study possible. These are, first, the scientists and technologists at both the Chemistry Department of the Florida State University and the Monsanto Textiles Company who answered questionnaires and provided us with feedback on online use. Dr. Carlos Cuadra offered valuable suggestions prior to the start of the study and also served as a consultant during the initial stage of the study. Mr. Paul Gann coordinated the study at Monsanto and also carried out online searches along with Mr. Frank Reynard. Searches at the Monsanto laboratories in Durham, North Carolina were conducted by Ms. Jan Williams. At the Florida State University, a Project Advisory Committee consisting of Chemistry Department faculty members Dr. Ronald Clark, Dr. Richard Glick, and Dr. George Levy advised on various planning aspects of the study. Also assisting in different aspects of the study were Dr. Gregory Choppin, Chemistry Department Chairman at the beginning of the study, and Dr. Martin Schwartz, Chemistry Department Chairman during the second and third phases of the study, as well as Mr. David Tranchand, Business Manager of the Chemistry Department who helped with the development of record-keeping for the study. Ms. Marcia Myers, Mrs. Sharon Selman, Ms. Bonnie Jackson, and Dr. Janice Fennell, the information specialists at Florida State who helped in the design of the study instruments, conducted online searches and collected data and assisted in data analysis. Mr. E. Walter Terrie served as computer programmer for the study. Mrs. Sheila Lutz typed some of the reports and manuscripts. Miss Celia Hales typed part of the final report. Mrs. Julie Winchell, the Project secretary, was of great help on all phases of the study.

INTRODUCTION

Online searching of bibliographic data bases constitutes an important new tool of the scientist and technologist and of the librarian concerned with meeting their information needs. According to Martha Williams in 1977, there were 50 million bibliographic records searchable online; about 29 million were to portions of the literature of science and technology. Also, in 1977, more than two million online searches were conducted. This represents a 40 percent increase over 1976.[1] Yet with all this activity in the field, relatively little is known about how and for what purpose scientists and technologists use online searches, their satisfaction with this new bibliographic service and what changes, if any, occur in the information style of scientists and technologists when online search service is introduced into the environment.

In 1976, a National Science Foundation (NSF) study was initiated at Florida State University (FSU) in an attempt to answer some of these questions. The study was done in three phases. In Phase I, online search service was introduced in two environments: at the Chemistry Department of FSU, the academic environment, and at the Monsanto Textiles Company, the industrial environment. During this first phase, free search service was offered in both environments. In the second phase, online searches were provided in the academic environment at half the cost of computer connect time and offline printing. In Phases I and II, searches were performed by information specialists. In the third phase, embedded in the second phase and again only performed in the academic environment, free online searches were offered on a self-service basis. The results of this work are given in this report.

1. Martha Williams, "1977 Data-Base and On-Line Statistics," Bulletin of the ASIS 4(2) (December, 1977): 21-23.

Objectives and Hypotheses

The primary objective of this study was to determine the effect of exposure to online search services on the overall information style of academic and industrial scientists and technologists. Information style, broadly defined, consists of the ways in which individuals go about obtaining information needed in their work. The change in the information environment was the introduction of a conveniently located, easy to use and (at first) no-cost online search service. Other changes introduced were in terms of cost (free versus half-cost) and in ways of searching (mediated versus non-mediated). Changes in information style were monitored with the aid of pre- and post-test questionnaires, user interviews, records of online use and user evaluation through feedback forms. A secondary objective was the gathering of data on the ways in which online systems are used by scientists, as an aid in the planning of online services.

The main hypothesis of the study was that exposure to online search services which are accessible, easy to use, and include relevant documents will change the information style of scientists and technologists. In looking for changes in information style, three indications of change were examined:

1. The use of online searches for different types of information needs. These needs include current awareness, exhaustive bibliographies, specific facts, and "a few references on a subject."
2. The decrease in use of other, previously used, information sources, such as personal scanning of journals, or depending upon input from colleagues.
3. The user's willingness and ability to perform his own online searches without going through an intermediary.

In addition to these indications, the characteristics of industrial and academic users were compared, including early and subsequent use, light, medium, and heavy use, and users in different age groups and with different jobs.

Experimental Design

In Phase I, prior to the introduction of online services, a pre-treatment survey instrument was completed by all participants. This instrument was designed to assess personal background, work histories, methods of information search and preference, and prior experience with online bibliographic searching. Mediated online search service was then introduced into the environment of the participants and provided at no cost, with searches conducted on request by trained information specialists. Following approximately one year of such service, another survey instrument was administered to assess impact and changes in information style. In addition to the questionnaire, selected participants were interviewed. Records of use and user evaluations were also obtained and analyzed.

In Phases II and III, the study was limited to the academic environment, the number of potential users was increased, and two significant changes--user charges and non-mediated searching--were introduced at different times. Records of use, user evaluations, and user interviews were obtained during this phase.

During the first phase, online searching service was provided at no charge to a selected sample of participants at FSU and at Monsanto. This phase began at Monsanto in late March 1976 and lasted thirteen months, while at FSU, this phase began in late May 1976 and continued for eleven months. At the end of this phase, the Monsanto technical library decided to take over full support for this service and provide it as a regular part of its library information support.

During the second phase, the search service was provided only at FSU and offered to all members of the Chemistry Department rather than a selected sample. Also during this phase, an indirect fee of one-half the cost of connect time and offline citations was charged to users to determine the impact of fees on the nature and volume of search requests. In Phase III, no-cost self-searching was made available to assess the attractiveness of "do-it-yourself" searching. Phase II began in mid-October 1977 and continued until late May 1978. Phase III lasted from February 1 to March 17, 1978.

Statistics for the phases are shown in Table 1.

Table 1

Project Descriptive Statistics

Phase I Free mediated searching	
FSU (May 28, 1976 - April 25, 1977)	
Sample population:	84
Sample participants:	70 (respondents to pre-test)
	50 (respondents to post-test)
Service users:	51
Non-users:	19
Total searches:	353
Monsanto (March 25, 1976 - June 30, 1977)	
Sample population:	311
Sample participants:	262 (respondents to pre-test)
	234 (coded post-tests)
Sample users:	109
Non-users:	153
Searches:	345

Table 1 (continued)

Phase II Half-cost mediated searching (Oct. 12, 1977 - May 31, 1978)

Users:	57
Graduate:	29
Research Associate/ Post-doctoral:	10
Faculty:	16
Other:	2
Searches:	155

Phase III Free non-mediated searching (Feb. 1, 1978 - Mar. 17, 1978)

Users:	44
Graduate:	32
Research Associate/ Post-doctoral:	7
Faculty:	2
Other:	4
Searches:	87

PROJECT ENVIRONMENT

This study was conducted over a two-year period at two locations, one academic, the other industrial. The academic environment was the Chemistry Department of Florida State University, Tallahassee, Florida. FSU has an enrollment of about 21,000 students, with about 3,500 graduate students. Doctoral programs are offered in 58 fields including chemistry, and the Chemistry Department is ranked nationally among the top twenty-five academic chemistry departments.

The industrial environment was provided by the Monsanto Textiles Company (MTC) technical operations at Pensacola, Florida, about 200 miles from Tallahassee. Monsanto has over 300 professional employees in its Research and Development Department. The Company's research and development at Pensacola is directed towards the study of melt spun fibers processes and properties, seeking ways to improve and modify nylon, polyester and related melt spun polymers.

Florida State University

The setting for actual query negotiations with users and for the online terminal equipment differed between FSU and Monsanto. At FSU, the computer terminal and the information specialists were located in the Chemistry Research Building where most of the potential users worked. The search service office was on the first floor near the main entrance, the elevators, the reading room and the departmental office so the location was highly convenient to all potential users. The reading room across the hall contained the printed volumes of Chemical Abstracts, the most frequently used reference source.

The search service office was used exclusively for the project service so there were no distractions by other activities. For most of the period of the experiment, the service operated twenty-five hours a week, typically

on a schedule of Monday, Tuesday, Wednesday and Friday from 9:30 a.m. to 3:00 p.m., and Thursday from 9:30 a.m. to 12:30 p.m. In the early months of the service, an effort was made to respond to requests for service in the evenings and on Saturdays but because of the low volume of use, this was not cost-effective and was discontinued. During the first phase of the project, service was maintained during the breaks between academic quarters. During the second phase, the service was closed during the winter (Christmas) break, but was kept open during the spring break.

The online terminal equipment used at FSU was, for the first five weeks, a T-33 ten characters-per-second impact printer. This was an interim unit as its slow speed and noisy operation made it unsuitable for continued interactive searching. On July 9, 1976, the T-33 was replaced by an NCR 260 terminal, a thirty characters-per-second thermal printer. This unit worked well throughout the first phase and its speed and quiet operation as compared with the T-33 emphasized the importance of these features in interactive searching. With the start of the second phase in October 1977, the NCR was replaced (because of its higher rental) by a DECwriter II, also thirty characters-per-second, but with an impact printer. The impact noise was muffled and the noise level was not noticeably higher than with the thermal printer. There were no "downtimes" due to terminal malfunction with the faster units. Downtime was either the result of telephone system problems or difficulties at the host computer, as will be noted later.

Monsanto Textiles Company

The online service at Monsanto was provided initially at the Pensacola, Florida facility, using two of the members of the corporate library staff as searchers. In August 1976, the librarian from the Durham, North Carolina plant was also trained as a searcher. Users were located at these two facilities plus a few users at a plant in Decatur, Alabama. All searches from Decatur were sent by telephone or in writing to the Pensacola library

for searching.

The installation at Pensacola used a Texas Instruments model 745 portable thermal terminal (30-characters-per-second) located in a small room in the technical library. This room was also used to store microfilm files (including Chemical Abstracts on microfilm) and a microfilm reader-printer. Most query negotiating was done in the individual offices of the information specialists; the specialist and the user would then go to the terminal for the actual search. Search service was available to users forty hours per week during the hours of 7:30 a.m. to 4:00 p.m. Not all potential users worked in the building that contained the library.

At the Durham facility, a Texas Instruments model 735 terminal was used, with a thirty characters-per-second thermal printer. The terminal was located in a library work room adjacent to the office of the librarian-searcher. She negotiated queries in her office and then went with the user to the terminal for the search. Search service was available to users forty hours per week between 8:00 a.m. and 4:30 p.m. Chemical Abstracts on microfilm was also available at this location.

Differences in Test Environment

It can be seen that the primary differences between the test environments were the longer hours that the service was available at Monsanto, the availability of Chemical Abstracts on microfilm as well as print at Monsanto while only in print at FSU, and the location of terminals within areas at Monsanto used for other activities, i.e., the library, while the FSU offices were used exclusively for the search service. The academic calendar had some influence on usage at FSU which, of course, was not the case at Monsanto. The primary difference in terms of intermediaries was that at Monsanto the searchers were company employees already engaged in providing information services to the potential users, whereas at FSU, the intermediaries came from

outside the department and were seen as providing only the service of online searching.

REVIEW OF THE LITERATURE

A review of the literature of information science and librarianship, primarily since 1974, was made to determine what had been published on five topics pertinent to the project: the effect of online searching on the informational style and productivity of users; user evaluations of, and satisfaction with, online searching; the use of intermediaries (librarians, information specialists) for online searching; the training for online searching of intermediaries and of final users (self searching); and the impact of user fees on the use of online services. The emphasis of writings about online searching has been on various technical aspects of online systems. Much less has been published on the topics of interest to this project.

Information Style

Rubenstein and his associates[1] described information "style" as the tendency to behave in a certain pattern in relation to information seeking and use, and this is the meaning as used in this report. In their study, Rubenstein et. al. concluded that information style appears to be relatively stable over long periods of time but is definitely affected by changes in the information environment. The introduction and availability of online bibliographic searching is just such a change but the response to this innovation may affect users differently. Herner reports that basic scientists tend to do their own literature searching, while applied scientists tend to have literature searches done for them. He explains these findings by pointing out that the basic scientist, unlike the applied scientist, needs to interact

1. A. H. Rubenstein, et. al., "Explorations on the Information Seeking Style of Researchers," in C. E. Nelson and D. K. Oollock, eds., Communication Among Scientists and Engineers (Lexington, MA: Heath and Company, 1970), pp. 209-31.

with the literature and that such interaction cannot be delegated.[2] Such attitudes toward the literature will clearly affect attitudes toward online searching.

Information style is also related to a person's evaluation of the value of information in a given situation. Hall, in his study of the values placed on information by scientific and technical workers, observes that different types of users have different criteria for evaluating information and information systems, and an individual's criteria may change as his role changes, i.e., from researcher to planner to administrator. This variability inevitably influences a person's information style at any particular time. Hall notes that researchers, for example, appear to place the highest value upon the qualitative aspects of information systems, such as convenience, flexibility and responsiveness. The research scientist also tends to want comprehensiveness in locating information, and frequently wants to obtain original documents.[3] Convenience of information is another important criterion for scientists. In a study of industrial and academic chemists' use of both offline and online computer-searched systems, Arnett concluded that chemists procure information from the sources which are closest at hand.[4] The availability of online systems affects all of these values.

A study by Allen and Gerstberger implies that information style is also influenced by the amount of experience a person has with a given information channel. Their study of electronics engineers showed that there was a strong positive relationship between the degree of experience with a given

2. Saul Herner, "Information Gathering Habits of Workers in Pure and Applied Sciences," Industrial and Engineering Chemistry 46 (1954): 228-36.

3. Homer J. Hall, User Values in the Selection of Information Services (Linden, NJ: Exxon Research & Engineering Company, 1977). EXXON/GRU.1 DK.77 (final report).

4. E. M. Arnett, "Computer-Based Chemical Information Services," Science 170 (1970): 1370-76.

information channel and the perception of that channel's accessibility and ease of use.[5] In other words, the more often a channel was used to gather information, the lower the perceived cost of using that channel. The effect of experience among users in this study is reflected in the contrasts between heavy, medium and light usage, discussed elsewhere in this report.

The effects of the introduction of computer-based bibliographic services in various environments has been reported by several investigators, although little comparative study among environments (as attempted in this present study) has been reported. Online services were made available to researchers at the Exxon Research and Engineering Company, with the conclusion that the researchers both accepted and became accustomed to the new information system.[6]

Colthurst and Shilling studied the introduction of online searching into an industrial research center in chemical and biological sciences. Since SDI service had existed for some years and was well accepted, it was expected that online searching would also be accepted and this was the case. User reaction was favorable, with four primary uses: for new ideas or topics in the start-up of long-term projects; to search for new topics within an existing field of research (the majority of search requests); to compliment SDI service; and to search topics where library materials were inadequate. The availability of the online system appears to have encouraged more queries of the types reported.[7]

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5. Thomas J. Allen and Peter G. Gerstberger, "Criteria for Selection of an Information" (Working Paper 284-67, A. P. Sloan School of Management, Massachusetts Institute of Technology, September, 1967).

6. Barbara Lawrence, Ben H. Weil and Margaret H. Graham, "Making On-Line Search Services Available in an Industrial Research Environment," Journal of the American Society for Information Science 25 (1974): 364-369.

7. J. P. Colthurst and M. E. Shilling, "On-Line Searching in a Research Environment," On-Line Review I (1977): 311-317.

Changes in information style of scientists caused by computer retrieval systems have been suggested by several studies. A 1975 study by Blase of health science library users at the University of Washington contrasted reactions to the use of a printed current awareness service with reactions to the use of an offline computerized retrieval system (SDILINE). SDILINE was seen by users as being of major value in alerting to new publications in fields of interest but, in general, the computer-based system did not change the literature scanning habits of most of the users.[8] Martin and Parsons, in their study of academic SDI users at the University of Texas found that while one-third of the respondents felt that a computerized SDI service had altered their method of keeping current with research, almost two-thirds felt that their information style had not been affected. The primary change reported was in decreased review of the literature in fields of interest.[9]

It is important to note that the studies by Blase and by Martin refer to SDI service, that is, computer-based but in an offline mode. Even with the inherent delay of such a system, some impact on information style is discernible but not definitive. Of concern in this study is the impact of an online, interactive and immediate response system. In the context of this project, SDI service was a minor aspect. Most users wanted help in searching specific, non-recurring requests. Before online searching was introduced, the information style of most of the academic users could be generally described as personal scanning of selected journals in fields of interest, maintenance of clipping or card files on articles of interest, and manual literature searches, based usually upon the printed version of

8. Nancy G. Blase, SDILINE Evaluation (Seattle, WA: University of Washington, 1975). ERIC ED 122775.

9. J. K. Martin and R. G. Parsons, "Evaluation of Current Awareness Service for Physics and Astronomy Literature," Journal of the American Society for Information Science 25 (1974): 156-161.

Chemical Abstracts or upon printed abstract and index journals. This literature searching was supplemented by information contacts with colleagues, use of personal files, and attendance at professional meetings.

In assessing the impact of interactive online systems on scientists, Curtis queried a small sample of scientists in the biological fields and concluded that "the use of on-line search systems by active bench bio-scientists employed largely in academic institutions will increase only gradually in the immediate future, that it will be most heavily used by junior scientists, and that it will be considered a secondary information source of moderate value."[10]

Finally, a survey which indirectly suggests the impact of online systems was done by the System Development Corporation. This survey reported on comments from over 500 organizations of all types which provided online searching services. The information system managers reported favorable reactions from users to the new system and, in over half of the organizations, there had been an increase in the number of users of the online system and in the number of search requests received.[11]

These citations are indicative of other writings as well which show that online searching can become an accepted part of an organization's information environment and resources, and that users will make online searching part of their information seeking pattern, either as a major aspect of, or as a supplement to, existing methods. What is needed is more definitive study on how online systems influence information style in a variety of environments and what the effect means to institution managers, system vendors, and to the users themselves. It is to this concern that the present

10. Dade T. Curtis, "On-Line Retrieval as an Information Source for Bench Bioscientists," On-Line Review 1 (1977): 279-288.

11. Judith Wanger, Mary Fishburn and Carlos A. Cuadra, On-Line Impact Study; Survey Report of On-Line Users, 1974-1975 (Santa Monica, CA: System Development Corporation, 1975).

study is addressed.

Use of Intermediaries

The way a potential online system user can and must interface with the system has been a subject of much interest and some study. An aspect of particular concern is the role of the intermediary, the specialist who does the "hands-on" searching. Marron and Fife highlight the reason for interest in this aspect: "The assumption that online systems, with their capability for direct and immediate access to information by all users, would automatically improve search performance and satisfy user needs, has not been borne out in many cases. It is ironic that online searching is most often done by the intermediary - the very person the online capability was supposed to replace. Recognition that the user community is heterogeneous, that not all users need or want to be online, and that the cost of training all users is high in both time and money, are factors in this trend."[12]

Lehigh University's LEADERMART online search system was designed from the start to be user-oriented. However, Christian points out that there were problems "because researchers were so seldom permitted to refine their searches 'hands on,' i.e., interacting directly with the data base itself." He goes on to say that "almost uniformly, experience with machine-readable data bases shows that a trained intermediary is definitely needed between the individual searcher and the system."[13]

A study of the use of online searching at a NASA research center observed that scientists and engineers were not using the search system directly and, further, "they prefer, for the most part, to entrust their needs to that of

12. Beatrice Marron and Dennis Fife, "Online Systems - Techniques and Services; the Role of the Intermediary," Annual Review of Information Science and Technology (1976):165-210.

13. Roger Christian, The Electronic Library: Bibliographic Data Bases 1975-76 (White Plains, New York: Knowledge Industry Publications, 1975), pp. 55-56.

an emissary - an intermediary - if indeed, they use it at all."[6] The study concluded that the center's new operating philosophy would be one of "open recognition that an intermediary will be the principal interface with the system" and that more formal training would be given to these information assistants.[14]

The use of an intermediary was studied at the research center of a major petroleum company where most of the users of an online system were chemists and engineers, and where the intermediary had a chemistry background. The interaction between the user and the intermediary was one of the factors in producing useful searches. As search results appeared the requester often revealed more details and the true purpose of the search. Further, the combination of the intermediary-specialist and the requester improved search quality because "this combination softens the psychological impact of dealing with a computer." It was also found that "although people are not too eager to learn how to do on-line searching for themselves - - this did not dim their enthusiasm for this type of searching. They seem quite happy to work as a team with an information chemist."[15]

Not everyone feels positively about the involvement of an intermediary in the state of online bibliographic searching; some contend that users are denied direct access to search systems because these systems are so complex that they require a trained intermediary to do the actual searching. "This fundamental limitation on the systems increases the total cost of searches by requiring a trained intermediary." This can also reduce

14. Adelaide A. Del Frate and Jane T. Riddle, Computer-user interaction: does it exist? Paper presented at the Forum on Interactive Bibliographic Systems, National Bureau of Standards, October 1971, printed in the ASIS Proceedings 36th annual meeting, Washington, D. C. 1973, v. 10, p. 45.
15. Lawrence, Weil, and Graham, op. cit.

the effectiveness of searches.[16]

Hock, from his review of the use of bibliographic data bases in academic libraries, notes the limitations stated by Gardner and Wax but points out that the advantages of using an intermediary are less time and cost consumed by searches. Disadvantages of a user doing self searching include the need for user training and the likelihood that occasional users would be unable to take full advantage of the system's capabilities.[17]

Finally, in a study focused on the user interface with searching systems, Zipperer points out that the human intermediary allows the search process to be adapted to each user's needs and situation. Inexperienced or unsure users can be given psychological and social support, while experienced users are helped to make their searches as effective as possible. He concludes that the results of the study support the position that "human intermediaries must be retained as an integral component of a network model." He sees the human element as critical for problem solving and he thinks that programmed instructional assistance for users might eventually become more effective "but at least at this point it is not conceivable that wide and successful usage of a search system can exist without the human intermediary." If users are to interact directly, "then extensive diagnostic or error detecting mechanisms are needed to protect both the user and the system . . . It is doubtful, however, that any automated system can ever approximate the human intermediaries' facility of knowing the user means 'no' or 'maybe' when he says 'yes'."[18]

Given the opportunity, will end users do their own searching? In the present study, all Phase I and Phase II searches were done with the aid

16. Jeffrey Gardner and David Wax, "On-line Bibliographic Searching," Library Journal 101 (1976):1827-1832.

17. Randolph Hock, "Providing Access to Externally Available Bibliographic Data Bases in an Academic Library," College and Research Libraries 36 (1975):208-215.

18. W. C. Zipperer, "User Interface Models for Multidisciplinary Bibliographic Information Dissemination Centers." ERIC ED 122846, August, 1975.

of an intermediary, while during Phase III, self searching was permitted ~~and a number of users responded, many of them new to online searching.~~ Relatively little has been published on self searching experiences, but Egeland reports on the online searching of biomedical literature for physicians, researchers and students, where self searching was allowed. Egeland points out that, after the initial novelty had worn off, even the users who at first expressed willingness to do their own searches became less and less interested in spending the time required. Users continued to express interest in and satisfaction with the online system but they requested that someone perform the searches for them.[19]

The Washington Area On-Line Users Group reports similar experiences among its members. Although end users were trained, after some time elapses, few of them continued to do their own searching, and "the consensus seemed to be that after an initial period of enthusiasm and excitement about 'going on-line,' the searching usually begins to devolve back onto libraries and information centers." The training for self searching that does seem to take hold was done slowly over a period of months in a controlled situation. This was time consuming and expensive but apparently effective in creating a trained self searcher.[20]

It would appear that, at the present state of technology and systems, hopes for extensive self searching are unfounded and that, in most situations, users will prefer to have intermediaries do the actual searching. Financial

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19. Janet Egeland, "User-Interaction in the State University of New York (SUNY) Biomedical Communication Network," in Donald E. Walker, ed., Interactive Bibliographic Search: the User/Computer Interface (Montvale, NJ: AFIPS Press, 1971), pp. 105-120. See also her article, The Importance of User Education and Training in a Multi-Data Base Online Information Network in Proceedings of the American Society for Information Science 11 (1974):137-140.

20. Thomas M. Haggerty, "Education of On-Line Users," Bulletin of the American Society for Information Science 3 (1977):20-21.

incentives are a definite factor, however, and can overcome reluctance to do personal searches.

Training of Searchers

An important concern with online systems is the amount of time and effort required to bring searchers up to a level of optimum efficiency in interactive searching. Aspects of training include proficiency in using the terminal, knowledge of the data bases to be searched, and understanding of the searching system to be used. Knowledge of the data base includes content of the data record, vocabulary, indexing principles used, and availability and use of subject vocabularies and other search aids. Some questions to consider regarding training are: how easy or difficult is it to train searchers? Is informal training as useful as formal training? What approaches to training are effective? Can a casual or infrequent user be trained adequately enough to use online searching efficiently?

Marron and Fife, in their summary of recent writings on user training, point out that there are two types of online users, the intermediary and the end user, and that the training provided one may not necessarily be appropriate for the other. They also cite Egeland as reporting that the emphasis in online user training has shifted from education of end users to the education and training of intermediaries. Intensive training in vocabulary usage and preparation of search strategies; provision of newsletters to users; periodic workshops; "hands-on" orientation to the terminal; online and telephone access for consultation and resolution of problems; computer-assisted instruction simulations in conjunction with the online retrieval system; and multi-media presentations which couple new online techniques with known manual retrieval techniques are some training approaches which have been described.[21]

21. Marron and Fife, op. cit. Section on User Training.

Gardner, Wax and Morrison state that regardless of whether the actual searcher is a subject specialist or a librarian, a more or less formal training program is essential. This training may last from one to six months and include classroom teaching, practical experience, and follow-up sessions. They also note that in situations where multiple data bases are accessed and several searchers are used, it is typical for one person to "specialize" in the use of one or two data bases. This specialization allows each searcher to become thoroughly familiar with one data base and presumably permits more efficient searches.[22]

Gardner and Wax say elsewhere that online searching, as presently done, requires libraries to make an "on-going commitment" to the training of professional librarians in the mechanics of searching. The result, they say, is that end users become uninvolved bystanders.[23]

Chalmers reports on a study of five training methods for the novice, occasional user of online bibliographic system. These methods were: system instruction only (providing a set of instructions plus online responses); system instruction with the addition of reading a systems reference pamphlet; systems instruction with the reading of a manual on interactive searching; system instruction plus a training lecture; and systems instruction plus all of the others. One conclusion of this study was that the amount of human assistance needed by searchers for their first session was statistically equal, regardless of the kind of preliminary training.[24]

Training takes time and time is money. In his study of an academic library setting, Hock found that an average of 3.3 hours of computer connect

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22. Jeffrey Gardner, David Wax, and R. D. Morrison, Jr, "The Delivery of Computer-Based Bibliographic Search Services by Academic and Research Libraries," ARL Management Supplement 2 (September, 1974), no. 2.

23. Gardner and Wax, op. cit.

24. Mary E. Chalmers, "A Study of Training Methodology for Information Retrieval Systems." Ph.D. dissertation, University of Pittsburgh, 1975.

time was needed per searcher in preparation for his first search. The initial searches by a new searcher naturally tend to take longer but the average search time dropped 11 minutes from the first month to the second month of actual searching. Charging this difference to training costs gives a cost of $140-$280 of connect time per person, depending on the data base used.[25]

A study of user training on an interactive system in a British hospital was reported by Kennedy. He found that the user's attitude toward computer systems is important when considering the acceptability of the system and the user's preparedness to cooperate with it. "For this reason it is essential that the training method does not antagonize the subject and conversely it should produce a more favourable attitude at the end of the training program." Since most of the subjects being trained were under great tension at the start of the training, the use of reading materials, such as a manual, helped ease this tension. The users were given a choice of learning from the machine or using a manual, but almost universally, the machine provided self-teaching which proved most effective. The concept of learning by trial and error with feedback from the machine gives better performance than just demonstration. "Overall, the results of the trial indicate that self-teaching is a most effective method of training on the interactive system."[26]

A study of users at an industrial research center suggested a similar conclusion, finding that the biggest barrier to users has been broken if people can sit down and begin to search after only brief instruction. The quality of related training and materials is also important. "The ease

25. Hock, op. cit.
26. T. C. S. Kennedy, "Some Behavioural Factors Affecting the Training of Naive Users of an Interactive Computer System," International Journal of Man-Machine Studies 7 (1975):817-834.

of learning a system is also definitely related to quality of training available. . .In learning a system's full capabilities. . .the quality of the system's users' manual and its index prove to be the most important key to continued success."27

In the present study training of intermediaries was done by the online system vendor and by in-house tutoring. Training of end users for self searching was done by the online service staff, using lecture, specially prepared materials, and hands-on exposure to the system. The effectiveness of these training methods is described elsewhere in this report.

User Evaluation

The satisfaction felt by the ultimate user of an online system is the primary criterion for the value of this method of information seeking. There is, however, no simple definition nor single measure of that satisfaction. Tessier and colleagues point out that, to a large degree, satisfaction is a state of mind -- an intellectual and emotional response -- experienced by the online system user. Satisfaction with system output is usually the measure emphasized in most studies but other considerations are also important, they believe, including user feelings toward the particular service and toward interaction with the intermediaries. The degree of satisfaction may be influenced both by the user's expectations and by the perceived costs of using the service.[28]

Most studies of user reactions and evaluations report a favorable response and positive attitude toward online searching. Unfortunately, many of the published studies of user reactions are based upon small samples, often no more than two dozen or so responses. Hoover's study of end users

27. Lawrence, Weil, and Graham, op. cit.
28. Judith A. Tessier, Wayne W. Crouch, and Pauline Atherton, "New Measure of User Satisfaction with Computer-Based Literature Searches," Special Libraries 68 (1977):383-389.

at the University of Utah library was based upon 26 responses,[29] while Fosdick's similar survey at a small engineering library likewise reflected 26 responses.[30] Curtis' questionnaire survey of bioscientists was based upon 57 replies.[31] In all cases, most users expressed satisfaction with online searching.

The more extensive survey by System Development Corporation reported on over 1200 replies but these respondents were primarily intermediaries rather than end users. The intermediaries were asked about end user reactions to online searching compared to previously available literature searching services, and of those respondents able to make comparisons, about two-thirds reported a favorable end user reaction; only three percent reported unfavorable reactions.[32] In the Lockheed study of online services in several California public libraries, Summit and Firschein reported that about 70 percent of the patrons found online searches to be "of considerable or major value."[33]

Marshall's survey on science departments of U.S. academic libraries found that online searches met user needs "most of the time" in 83 percent of the cases, and "all of the time" in about five percent of the cases.[34] Online users at an industrial research center found even negative searches useful; the requester had definitive results which he could accept because he knew that several search strategies had been tried.[35]

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29. Ryan E. Hoover, "Patron Appraisal of Computer-Aided On-Line Bibliographic Retrieval Services" Journal of Library Automation 9 (1976):335-350.
30. Howard Fosdick, "An SDC-Based On-Line Search Service" Special Libraries 68 (1977):305-312.
31. Curtis, op. cit.
32. Wanger, op. cit.
33. Roger K. Summit and Oscar Firschein, "Public Library Use of Online Bibliographic Retrieval Services: Experiences in Four Public Libraries in Northern California" Online 1 (1977):48-64.
34. Doris B. Marshall, "A Survey of the Use of On-Line Computer-Based Scientific Search Services by Academic Libraries" Chemical Information Bulletin 27 (fall, 1975):17.
35. Lawrence, op. cit.

User satisfaction also appears to be related to whether or not the user was present for the search. Hock says, "The impression has been gained that requesters who were actually present for the searches seem frequently more satisfied than those who opted to delegate the search." He believes this is due to the increased relevance of what was retrieved and the ability of the user to better understand the capacilities and limitations of the search system.[36] This impression seems to be supported by findings of this project, particularly when comparing the academic with the industrial users.

The benefit of online searching most often mentioned by users is the time saved in checking published materials, compared with manual searches. Anyone who has had to do an extensive manual search through printed documents can readily appreciate the value of a system that can reveal more references in ten minutes than a manual search could reveal in an hour. Elchesen documents that approximately five online searches may be conducted in the time required to perform a single manual search, and with generally better results.[37] In the Blase study already cited, one-third of the users reported that online searching saved a significant amount of their time.

In the present study, most users in both the academic and industrial environments expressed satisfaction with online searching, both with the results obtained and with the process of interacting with the system. The statistical analysis of user reactions is reported elsewhere but some typical user comments suggest the feelings of many. One industrial bench chemist said of the online system that he was "so doggone happy with it"

36. Hock, op. cit.
37. Dennis R. Elchesen, "Cost-Effectiveness Comparison of Manual and On-Line Retrospective Bibliographic Searching," Journal of the American Society for Information Science 29 (1978):56-66.

after having to do manual searching for so long that he didn't see how the system could be improved. An academic research associate wrote, "The results of these searches were of great help and saved me time." Another academic searcher said, "The amount of time saved by this on-line search is phenomenal, and if we were being charged for this service, the actual cost of the search would be well justified." Several academic users emphatically agreed that their work productivity had been noticeably increased because online searching was available.

Effect of User Fees

Since Phase II of the project involved some form of search fee charged to the user, the impact of instituting such a fee after a period of free searching was a matter of interest. Most academic and research libraries recover at least some of their costs for providing online searching because they are financially unable to do the searches otherwise. The methods of charging include: charging for actual terminal connect time and printed offline citations; charging for all related costs including staff time; or having a standard (flat) fee for all searches. In some cases, there may be special student rates and, in academic settings, charges may be applied against departmental budgets or research grants, as well as being paid for personally.

The imposition of fees clearly affects patron use. Gardner observes that in those instances where user fees have been initiated after a start up period of free services, use has invariably dropped dramatically; where user fees have existed from the beginning, use has expanded slowly.[38] Hoover's study at the University of Utah showed that about 80 percent of the users said that they would continue using the search service at an increased price ($5 instead of $3), and after the price was actually

38. Gardner, op. cit.

increased, "use by all classes of patrons has consistently increased. . . there was no noticeable drop in use of the service when the new higher prices went into effect. . ."[39] Firschein and Summit reviewed online use at four California public libraries over three phases: a no-charge period, a charge of one-half the normal cost, and a phase in which the patron was charged the full cost of the online search. With the introduction of the half-cost fee in the second year of the project, there was "a large drop in demand" for online searches, but going to a full cost fee made little difference in the volume of searches or patron attitudes.[40]

In the present study, a period of free searching was followed by a period of half-cost (though indirect) charges. The effect of this fee can be seen in the volume of searches done and, graphically, in the plot of weighted average searches.

39. Hoover, op. cit.
40. Summit, op. cit.

PHASE I: FREE, MEDIATED SEARCHING

Phase I, consisting of no-cost searching through intermediaries, was conducted at FSU for eleven months (late May 1976 to late April 1977) and at Monsanto for thirteen months (late March 1976 to late June 1977). This phase of the project was characterized by free searches for users, services provided in two contrasting environments, and the use of intermediaries who helped users refine queries and performed the actual online searching.

Sample Participants

At FSU, the project participants were 70 academic chemists, research associates and graduate students who completed detailed questionnaires on their information habits, prior to the introduction of online searching. Of the academic participants, 57 percent held the doctorate degree; about one third (36%) were faculty members, while 37 percent were advanced doctoral students, and the remainder were research associates or post-doctoral fellows. Of the academic sample, 71 percent were born in 1940 or later, and 87 percent were male.

At Monsanto, 262 scientists and technologists completed similar questionnaires. Of the industrial participants, about one-third (32%) held doctoral-level degrees. Three-fifths were trained in a field of chemistry, while one-fifth were trained in engineering. One-fourth (26%) of the respondents were identified as supervisory personnel, while the remaining three-fourths worked in non-supervisory positions, such as bench chemist or research associate. About one-third were born in 1940 or later, and 90 percent were male.

During this phase of the project 345 searches were conducted for 108 out of the 262 eligible industrial participants, while 353 searches were performed for 51 out of the 70 eligible academic chemists.

Questionnaire Survey

Prior to the introduction of online searching, Monsanto participants responded to a questionnaire of 108 items, while FSU participants replied to a similar questionnaire. There were some variations between the two questionnaires in the number and wording of questions due to differences in applicable categories between an academic and an industrial environment (see Appendix). These questionnaires were designed to assess personal backgrounds, recent and present job requirements and related methods of information seeking, and prior experience with online bibliographic search services. Questionnaires were distributed through inter-office mails at both locations with telephone and mail followups to non-respondents. A cut-off date was established and only those questionnaires received by that point were considered for data analysis. A user identification number was assigned to each questionnaire.

Each question on the returned questionnaires was coded for computer analysis, using optical character recognition input. Statistical analysis of the data was done using the Statistical Package for Social Sciences (SPSS) computer program; an example of this output is found in the Appendix. Outputs were prepared for each test site individually and also with comparative data between the sites.

Following the conclusion of Phase I, a post-treatment questionnaire (see Appendix) was distributed to participants. Because of losses due to job transfers or departures from campus, the number of respondents to this second survey were less than at the beginning of the project; post-test respondents at Monsanto totalled 234, compared with 262 who completed the pre-test, while 50 persons at FSU completed post-tests, compared with 70 pre-tests.

Information Specialists

The intermediaries, or information specialists, at FSU during the

project included three library science doctoral candidates, one library science masters' student, and one person with a masters' and course work in biology and chemistry. Four were female, one was male. The two specialists who worked on the project at its start, along with one Monsanto specialist, received two days of on-site training from the vendor, System Development Corporation. The two FSU specialists in turn trained the others who came later (although one of the later specialists had prior experience with the SDC system).

The initial concern of the library science searchers was over their lack of knowledge of chemistry terminology and concepts, while the searcher with the chemistry background expressed hesitancy about the query negotiation process and techniques. The subjective assessment of all of the specialists was that subject knowledge, while helpful, was not a necessity for effective searches in perhaps 90 percent of the interactive situations. More important was an understanding of the data base, the indexing principles used, and the design of efficient search strategies.

The two searchers (both male) at the Monsanto facility in Pensacola were professional staff members of the company library, with knowledge of chemistry research and some prior experience with online systems. The searcher (female) at the Durham site was a company librarian, also familiar with chemistry research queries.

Test Instruments

Instruments used during the course of the project were for data-gathering. In addition to the pre- and post-treatment questionnaires already described, there were the Information Specialist's Record of Online Use, the User Reaction Form (see Appendix) and, at FSU, a logbook for informal observations.

The Information Specialist's Record was prepared for each search. Part was completed with the user, while the rest was completed by the

information specialist alone. This record described the type of search, the user's need for the information, expectations of results, prior information seeking on this topic, and the user's intended purpose for the results. To this information the specialist added the database used, online time, offline citations printed, system problems, and other objective aspects of the interaction.

The User's Reaction Form was designed to get the user's assessment of the pertinence and value of the output produced. This was a simple form, with four short-answer or multiple-choice questions, plus a question for general comments.

With the online results, the user was given a User Reaction Form to complete and return to the project office (or, at Monsanto, the library). When offline citations were being printed, the reaction form was held until the offline citations were received, then attached to the offline and sent to the user.

A completed User Reaction Form was attached to the corresponding Information Specialist's Form to create a search "feedback form." This feedback form was then transcribed, item by item, onto optical-character recognition sheets for entry into computer file. Records from Monsanto were received periodically at FSU during the project and transcribed in the same manner.

The logbook of observations (FSU only) was essentially a diary in which the information specialists noted unusual search queries, significant user comments or reactions, and technical notes on system operation or search strategy development. This logbook provided continuity among the different specialists and provided a resource for illustrative material to supplement the statistical analysis and reporting.

The reporting and analysis instruments were primarily the monthly search reports prepared by the specialists, and the variety of computer

outputs from the SPSS program. The monthly reports summarized usage by type of user, showed total searches and unique searchers, and recorded pertinent averages. This report provided a basis for monitoring usage and for decisions on the operations of the service.

The computer outputs were of several types and included all appropriate statistical calculations, as well as tabular presentations of key variables against all questionnaire items and against usage variations.

Philosophy and Publicity

The philosophy of the search service was to provide a maximum of online searching within the capabilities of the system. This meant that no real limitations were placed on such things as citations printed (although quantities above about twenty were usually printed offline) or on amount of time spent in conducting a search. As much time was taken in query negotiation as seemed necessary and users were made to feel welcome and encouraged to use the service often.

During the course of Phase I, publicity about the service and encouragements for its use were made periodically. At Monsanto, the library director presented a series of lectures with demonstration to various technical groups, as well as promoting the service through memos to sample participants. At FSU, presentations were made to faculty groups, reminder memos were sent on several occasions to sample participants, and some faculty members described the service to their classes. As has been found in other situations, word-of-mouth publicity is also an effective channel.

Query Negotiation

In most cases at both FSU and Monsanto, users came to the search service office or library to present and discuss search requests. In some cases at Monsanto, search requests were received by telephone or by mail. Discussions of the request (negotiation) took place to clarify the request by determining intended use, possible synonyms for terms, limitations on the search, e.g.

by date, language or author, and correct search logic.

Initial users were given an explanation of the purpose of the project, the content of the primary data bases, and the method of interactive searching. The more experienced users often appeared with their searches written in Boolean logic form but even infrequent users seemed to quickly grasp the basics of the search process.

The negotiation process in interactive searching has been the subject of some research. On study in an academic setting reported by Zipperer[1] identifies seven "events" in the user interface with an online system, and these events provide a framework for describing the interaction in this project. The events are as follows:

1. Question negotiation - presentation and clarification of the user's question.
2. Profile development - vocabulary related events such as selection, deletion, and truncation of terms.
3. Tutorial activities - detailed explanation of data base indexing policies, retrospective holdings, and data base coverage.
4. Search type selection - choice of retrospective/current awareness or both.
5. Strategy formulation - events concerned with analysis of the questions, identification of the concepts and specification of the relationships between concepts.
6. System description - descriptions of general system characteristics such as search schedules and procedures.
7. Data base selection.

Zipperer emphasizes that the process in not linear; it has no distinct event

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1. W. C. Zipperer, "User Interface Models for Multidisciplinary Bibliographic Information Dissemination Centers," ERIC ED 122846, August, 1975.

patterns and this was true with the negotiations carried out by the project staff.

The typical user would arrive with the major concepts of his search written down and would offer a short explanation of his search topic. Some users explained their needs from memory. During this time of explanation, the information specialist noted whether the user had provided synonyms or logic and what initial constraints, e.g., author, time period, etc., were mentioned. This phase of the interview varied from new users who provided little elaboration to more experienced users who sometimes arrived with their search strategy carefully mapped out, completed with indicated truncations, and logical combinations of search terms. The results of consultations with colleagues was sometimes evident, with some users building upon the results of other searchers' strategies, knowledge or experiences with the system.

Question negotiation, profile development, and strategy formulation, as noted by Zipperer and confirmed by the specialists in this project, are closely interrelated, and it is not always possible to distinguish among them. Clarification of the query generally revolved around identifying the separate concepts of the query and their relationship(s) with each other. The user was also asked about alternative ways of expressing his search problem through synonyms, acronyms, abbreviations, and related terms.

The query negotiation process took varied amounts of time depending upon the user's experience and the subject being searched. Questions in the "hard" sciences appear to be more quickly definable because of the more precise vocabulary used, in contrast to social sciences and humanities where queries often must be discussed and refined at length to achieve enough precision for effective searching. Somerville, describing query negotiations for computer searches in an academic setting, reported that "the length of reference interviews may require between five and sixty minutes, with the

majority ranging from twenty to forty minutes."[2] This is supported by comments of the online searcher/librarian at the Science and Technology Department of FSU's Strozier Library. She estimated that the average negotiation, particularly in a social science data base, took forty minutes, while negotiations for searches in chemical or medical data bases usually took less than ten minutes.

The statistics on average query negotiation for the searches in this project are discussed elsewhere but most did not exceed five minutes. There was relatively little time spent explaining details of the data base record or indexing or search procedures; particularly to experienced users. (In the second phase of the project, a handout for users (see Appendix) was prepared which explained search logic and how to prepare a search strategy but most users seemed content to work out a strategy with the specialist.)

Search Strategy Development

Most searches were performed only in the chemical data bases (CHEMCON and CHEM7071) although after BIOSIS and BIO6973 became available, they were also used to some extent. During the preliminary discussions, the information specialist would note the possible need to explore other data bases. Users were made aware of the variety of data bases available but most did not wish to explore data bases outside the chemical and biological fields.

Since both chemistry and biology data bases had two separate files, divided by date, the discussion of data bases to use provided an opportune time to select the type of search - current, retrospective or both. Most users appeared to make this decision based on the time period during which most of the work had been done on the subject of their interest. The number of references was also a factor, particularly if the first data

2. A. N. Somerville, "The Place of the Reference Interview in Computer Searching: the Academic Setting," Online 1 (1977):14-23.

base searched yielded fewer or more citations than desired.

During search strategy development, vocabulary aids were consulted as appropriate. The Merck Index and The Encyclopedia of Chemistry (Hampel and Hawley) were available but infrequently used. The SDC CHEMCON Index (April 1976) on microfiche was used extensively, while CA microfiche indexes of word frequencies, phrases and key letters were used to a much lesser degree. These aids proved useful in identifying variant spellings, deciding on truncations, and indicating the approximate number of citations that might be generated.

Prior to actual searching, the search statements with appropriate Boolean operators were written out. The strategy was spelled out as carefully as possible, not to preclude interaction but to anticipate potential problems and to develop possible alternatives in advance. The user, when present, was encouraged to participate by "thinking ahead" about ways his search could be narrowed or broadened.

Most academic users were patient with the negotiation and interaction process. A few did not seem to become involved with it and would leave a search request with the specialist but not stay for negotiation. One user often brought a written request to the service office at closing time, thus eliminating the possibility of much negotiation. Another user preferred to get online immediately without much written down and without any negotiation. A few users, after initial searches were performed for them, appeared with search strategies completely formulated and wanted little or no deviation from them. Some of these proved hard to convince about matters such as the need for truncating or entering all possible synonyms and forms of a term to retrieve the most citations. (The system proved a better teacher on these points than the information specialist.)

Comparatively little time was spent in either tutorial activities or system description. Users were told of the project purpose, the information

contained in the various data bases, and the amount and kind of information that could be printed for citations. Users were also cautioned that although the online search took much less time than a manual search, its results were no more current than the information in the printed indexes because of the lag time before a publication is indexed or abstracted. A common misconception which had to be dispelled was that the subject index of Chemical Abstracts rather than titles and selected key words were being searched by the system. Information about the system itself was interspersed throughout the query negotiation as either the user made inquiries about specific capabilities or the intermediary identified a need for various features.

Informal Observations

Informal observations by the information specialists at FSU will give some "flavor" to the way the search service was used and perceived. The very first search request was a difficult one because it was an exhaustive and complex search which required the linking of several concepts, each with possible synonyms (e.g., abbreviations, acronyms, different ways of naming the same chemical compound) that had to be thought of and searched in the microfiche for spelling variations. The user, a fourth-year doctoral student in physical chemistry, stayed during the entire search; in fact, midway during the negotiation period, he called his wife (also a student) to come see the search procedure and results. Both of them were interested in how the system worked and in how to formulate a good strategy, asking numerous questions during the course of negotiation. Although 40 minutes computer connect time was spent, the search was delayed by a Tymshare disconnect problem. Eventually 10 citations were printed online and 54 requested offline. On his User Reaction form, the user indicated he only intended to pursue four citations for his oral presentation at a conference meeting. While the citations retrieved were "just about the right number,"

10 known citations relevant to the search topic were not retrieved. The user felt that although the "nice and friendly personnel" and the acceptability of the terminal were positive aspects, the search itself was "too time consuming (in terms of output/input ratio)." This, however, did not discourage the user from returning to use the service; he requested a second search two months later.

Another search request was from a graduate student approximately three weeks prior to her comprehensive examinations, after which her dissertation work would be started. The request, delivered in person and in writing, was to cover seven data bases coordinating three separate concepts. In this case the search was broad and retrospective, looking for something that was not there. Jokingly, the information specialist was told, "if you find anything on ____ and ____ and ____, burn the terminal!" While key concepts and some synonyms were supplied, others had to be elicited after a trial search on CHEMCON. The search was run over a two-week period and eventually 503 citations were retrieved. The user felt the search results for her intended purpose were "very useful." She commented that "while there were too many citations, the nature of the search required a certain vagueness in order to insure that all potential developments in the area. . .were retrieved. Thus, the excessive number of citations was necessary." This user returned several months later when she needed more background information on her dissertation topic for oral examinations.

Previous experience with online searching may have had little influence on initial interest in the service. Of the eleven original sample members inquiring about the service on the first day of operation, seven had never used an online search system before, although they felt it would significantly improve their current method of doing an information search. Four

had used an online search system before; three of these felt such a service would significantly improve their current method of doing an information search, while the fourth was uncertain.

The most frequent questions from early users observed by the information specialists were "how much will it cost me?", "how long will you be here?" In fact, most of the early users seemed so pleased to have the convenient service that this probably resulted in a halo effect on the User Reaction forms.

Search delays fall into two main categories: delays due to equipment and delays due to intervening users. In general, users seemed to understand the host down, terminal malfunction type of delays. They returned when the search service was expected to be operational or waited for notification that the search could be or was executed. When offline printouts were lost, users sympathetically returned with their initial online printout so the search could be repeated.

There seemed to be no true pattern to intervening user type delays. Each user reacted differently at different times, depending upon the circumstances. When the information specialist was already online at the terminal with one user, some chemists needing a search went off for coffee and returned later the same day; some, busy with classes, "boiling" mixtures and other things, did not return until later in the same week; some watched the search in progress; some waited their turn at the terminal in an adjoining room; one user came back several times in one day waiting for the terminal to be free; one user offered to get off the terminal so that others could have their search run; others preferred to make appointments; and still others interrupted the information specialist at the terminal, handed her a scrap of paper with some key words written on it, and rushed out of the room.

Some users were very surprised with their search results. During one

search a post-doctoral fellow was startled to retrieve his own dissertation. In an author search on a faculty member's own name, citations to documents by another author with the same name were retrieved. That faculty member was pleased to discover why he had been getting strange reprint requests. The biochemists are often pleased to discover there is so much of potential interest to them in CHEMCON.

Users have commented on the time saved by using the online search service. One faculty member remarked that a particular search had saved him about a week's work. He later commented that he used the computer-retrieved citations from another search to supplement his use of Current Contents, searching his collection of reprints, and browsing in the library in order to get an article ready for publication. Some users depend upon the online searches more completely. One doctoral student remarked that "if the computer can't find it, then I certainly can't."

Depending upon the particular topic, the number of citations retrieved may or may not influence satisfaction with results. One doctoral student was very satisfied with only three citations retrieved on eight compounds; except for commenting "too many citations," this same doctoral student was just as satisfied with 147 citations retrieved on another compound. Another doctoral student was pleased to retrieve no citations on a particular chemical he was synthesizing.

Most of the online searches were performed for research applications. These ranged from seeing what existed on a specific compound to exhaustive literature reviews for grant proposals. Online searches were also used to study for oral comprehensive exams, to learn about a seminar topic, to review recent writings of FSU faculty members and conference or colloquium speakers, to browse for new ideas, to search for vaguely remembered articles written by other authors or written by themselves. Sometimes a user would bring in the title of a particular article and ask for further bibliographic

information on it. Other times the author and his field were known and the information specialist was asked to retrieve his most recent article.

Some student users readily admitted they were gathering data for their major professor while others were more reluctant to admit the search was not for themselves, thus making proxy searches sometimes difficult to unravel. One post-doctoral fellow requested a search to see if enough information existed for her research professor, chairman of a professional program committee, to arrange a symposium. On another occasion a search was negotiated and further narrowed online with one doctoral student; however, when the offline printout was requested he revealed the fact that the search was actually for another doctoral student who was "too busy" to come himself.

Search referrals were also difficult to unravel. No doubt the search service was a topic of conversation in the coffee room. Sometimes a new user would volunteer that he/she was sent down by "X" or would mention having seen a printout. One one occasion a faculty member who had used the service the week before actually brought down one of his graduate students, introduced him and left him to do a search. Sometimes a returning user would bring in someone new to observe a search being negotiated and subsequently this observer would return on another occasion to use the service himself. One chain referral case was particularly interesting and was perhaps a measure of the initial user's satisfaction with his search. A faculty member, who had not at that time completed his pre-test questionnaire, stopped by to see what the search service was all about. The information specialist suggested performing a search on his major area of interest. Apparently this demonstration impressed him for he completed and returned the questionnaire the next day. Several days later he sent a new user down, a post-doctoral fellow who was working with another faculty member. In fact, during this second search, he checked in to see how things were

going. A day later another faculty member came in to see the search service set-up. He, in turn, mentioned that his "post-doc" was in the previous day.

Training of Intermediaries

If intermediaries are used in online searching, they must be trained. The following methods can be used singly or in combination: introductory workshops or seminars, adequate practice time, training on specific data bases, or refresher training and updating. All of these methods were used at one time or another by members of the project staff.

Initially, at FSU, two information specialists were hired to be intermediaries between the online system and the chemists. One person was a doctoral student in library science, had served as a reference librarian in an academic institution, and had experience interviewing patrons with reference requests. The other person had a graduate degree in biology and some training in chemistry; thus she was familiar with the subject terminology. Neither was familiar with online search systems.

Prior to beginning the search service, a formal training session was planned and subsequently conducted by the vendor, System Development Corporation (SDC). Training manuals were provided to the staff for their study prior to the instructor's arrival. Some search requests were also obtained from Chemistry Department faculty members so the project staff would have practice with real searches.

Two months before the beginning of service the SDC instructor arrived for a two-day training session. Those participating were the two researchers; the two information specialists from FSU; one information specialist from Monsanto; and the librarian-online searcher from the FSU library.

Initial training consisted of an introduction for new users, including log-on and log-off procedures and the use of various commands. Two terminals, an Execuport and a Scope Data, were available for hands-on experience by the

six participants. Later, the requests which had been submitted by the chemistry faculty were run as actual searches. Results were printed both on-line and off-line as a training measure and also in order to enhance the relationship between the project and the Chemistry Department.

More advanced training was then given with more intricate search strategies and commands being discussed. One faculty member brought in a well-thought-out request for an online search, and participants observed as the SDC instructor conducted a lengthy pre-search interview which included using the SDC CHEMCON microfiche index, the CA list of sections, and interactions with the user. Following the interview the request was searched on the Scope Data terminal. This gave the trainees an opportunity to observe the type of interaction which takes place between the intermediary and the requestor as well as the interaction at the terminal.

When the remaining information specialists were hired no vendor-provided training programs were utilized. Of the three persons hired subsequently, two were doctoral students in library science with experience in reference departments of academic libraries and one was a master's level student with some computer experience. Instructions for these three people consisted of their reading the ORBIT and CHEMCON manuals and informal over-the-shoulder or personal instruction given by the more experienced members. This was followed by additional on-the-job training, the use of the NTIS demonstration data base, and the study of previously run searches.

After some initial practice typing on the terminal and helping construct and revise search strategies, the information specialists were given the opportunity to construct some searches on any subject desired and then to perform the searches in the data base most related to that subject. This served to acquaint the searcher even more with the construction of strategies, the capabilities of the system as well as with the differences between data bases; e.g., some have free-text searching while others have controlled

vocabularies; some allow multiword terms or phrases; others allow single word terms to be entered and searched. Since the search service was available to persons connected with the Chemistry Department, emphasis was placed upon search formulations and strategies applicable to the chemistry data bases, e.g., CHEMCON and CHEM7071.

The information specialists felt competent enough to perform searches for the patrons after the practice with the NTIS "demo," repeating the previously done searches, and devising original searches. The first few searches were done with an experienced searcher as a back-up person in case of difficulty. After one or two searches, the new information specialists began to actively perform searches for chemists.

Advantages and disadvantages may be seen in the various methods used for training. The SDC-sponsored training session had the advantage of being formally organized and conducted by the vendor who supplied the data bases. It served as an introduction to the ORBIT system and also introduced the basic concepts of searching to the search staff. A formally conducted training session usually is fairly expensive and some of the participants in the training commented that an equal amount of money might be spent for online practice sessions on an unsupervised basis with equal or better results.

One problem associated with over-the-shoulder or personal instruction is the aspect of human bias which may enter into the training. The instructor may give his/her own interpretation of the "proper" use, strategies, or commands of the system. Examples of this may be seen in the emphasis which one person may place upon string searching as opposed to the lack of use of that particicular command by another person. Persons trained by other information specialists may tend to use the same methods and commands which were emphasized to them. A positive aspect of this method was the insights provided about the service clientele and their approach to the service.

In both formal training and personal training the mechanics of searching,

i.e., terminal operation and use, formulation of search strategy and concepts, were emphasized. Less emphasis was placed upon the intricacies of the individual data bases, i.e., their content, indexing principles employed, and available search aids. Perhaps this was true because most of the information specialists had experience working with printed indexes and abstracts in the chemical field as well as in other subject areas.

PHASE I - ANALYSIS OF USERS

Users and Non-Users

Computer-readable bibliographic data bases are information retrieval innovations generally available for the past decade. While batch processing has a longer history, widespread adoption of online searching has only taken place since mid-decade.[1] Consequently, little solid empirical research is available on the characteristics of users and nonusers of these computer-readable bibliographic data bases. Rather, much of the research has been conducted only on users,[2] with generally small samples,[3] and/or often with relatively low response rates to assessment instruments.[4] Because of the relative recency of general adoption of interactive systems, these generalizations are even more applicable to online bibliographic search services.

In comparison, the present study, based on a relatively large sample, collected comprehensive data on virtaully all potential users and subsequent nonusers of online bibliographic search services, prior to the introduction of such capability into the working environment. Standard demographic background data, measures of "information style" and information needs, and data on prior online search service use and/or evaluation was part of this comprehensive instrument.

In this section, these data are linked to the prediction of subsequent use or nonuse of online search services. However, some prior research would

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1. J. J. Gardner, and D. M. Wax, "Online Bibliographic Services," Library Journal 101 (1976):1827-1832.

2. B. Lawrence, B. H. Weil, and M. H. Graham, "Making On-Line Search Available in an Industrial Research Environment," Journal of the American Society for Information Scientists 25 (1974):364-369.

3. D. T. Curtis, "On-line Retrieval as an Information Source for Bench Bioscientists," On-line Review 1 (1974):279-288.

4. J. L. Carmon, and M. K. Park, "User Assessment of Computer-Based Bibliographic Retrieval Services," Journal of Chemical Documentation 13 (1973):24-29.

suggest that we might expect little relationship between these types of factors and subsequent use. In a recent study of science and engineering faculty members in ten university departments, for example, demographic and professional background characteristics, value orientations, and past scholarly productivity were found to be unrelated to use of a newly introduced batch-processed current awareness service.[5] Similarly, a recent study of searchers and nonsearchers with an online system found little or no correlation with knowledge that searches can be made, availability of search services, areas of research, age of individuals, and money needed to pay for searches.[6] However, these particular studies were based on relatively homogeneous samples (doctorate holders); in contrast, the present study employs a broad range of persons, with substantial variation in professional training and experience, different work assignments and job task expectations, and variation in the need for technical information and literature review.

Study Sample and Methodology

The present study sample includes scientists and technologists in two distinctly different work settings: industrial and academic. These two settings typically require, or result in, distinctly different "styles" of information gathering.[7,8] In practically any respect--use of information channels, reliance on informal communication, sources or references, and library usage--scientists and technologists in these two environments operate differently.[9]

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5. L. W. Stern, C. S. Craig, A. J. LaGreca, and R. G. Salem, "The Effect of Sociometric Location on the Adoption of an Innovation within a University Faculty," Sociology of Education 49 (1976):90-96.

6. Lawrence, op. cit.

7. J. S. Gilmore, W. S. Gould, T. D. Browne, C. von E. Bickert, and D. C. Coddington, "The Channels of Technology Acquisition in Commercial Firms and the NASA Dissemination Program," NASA Report CR-790 (1967).

8. D. N. Wood and D. R. L. Hamilton, "The Information Requirements of Mechanical Engineers--Report on a Recent Survey," Library Association (1967).

9. D. N. Wood, "User Studies: A Review of Literature from 1966 to 1970," ASLIB Proceedings 23 (1971):11-23.

In the industrial setting, a large facility of an international chemistry-oriented firm, 262 scientists and technologists were identified as potential users of an online search service and completed questionnaires prior to the introduction of such a search service. Of the participants, 98 percent had completed a college education and approximately one-third (32 percent) held a doctorate. Three-fifths were trained in a field of chemistry, and one-fifth in engineering. One-fourth (26 percent) were identified as supervisory personnel, and the remainder as non-supervisory.

A total of 70 academic chemists were identified as potential users of an online search service and completed questionnaires prior to the introduction of such a search service. Of the participants, 57 percent held the doctorate. More than one-third (36 percent) were faculty members, 37 percent were advanced doctoral students, and the remainder were research associates or postdoctoral fellows.

Prior to the introduction of online services, a pretreatment survey instrument was completed by all participants. This instrument was designed to assess personal background and work histories, recent and present job requirements and related methods of information search and preference, and prior experience with online bibliographic search services, if any. Mediated online search service capability was then introduced in a location conveniently accessible to members of both samples. Searches were conducted on request and free of charge by trained information specialists for approximately one year in each location. During this phase 345 searches were conducted for 108 out of the 262 eligible industrial scientists and technologists; 353 searches were conducted for 50 out of the 70 eligible academic chemists.

Given the above research base, the present analyses focus on two questions. First, are there some demographic and background variables,

measures of information "styles" and needs, and data on prior online search service or evaluation which are clearly related to subsequent use of online search services when a relatively heterogeneous cross-section of scientists and technologists are given the opportunity for generally unlimited, assisted, and free access to such a capability?

Our second question is whether these relationships are relatively stable within different environments. Despite the distinctly different "character" of these two settings, are there replicable similarities in traits of scientists and technologists which allow us to predict, regardless of work setting, who will most likely seek to use online search services if they are made available?

To address these questions, we used two distinct research strategies. The first was basically a descriptive bivariate analysis of common items of information collected from sample subjects in both the academic and the industrial settings. Included are three sets of data: (1) demographic (age, sex), professional training (degree level and field of formal training), and present professional position; (2) established information "styles" and appraisal of adequacy of informational resources; and (3) prior online search service use and evaluation.

The second analysis employed a multivariate procedure which allows all statistically significant predictor variables to enter a regression equation where the criterion (dichotomous dummy variable) is subsequent use or nonuse of the online bibliographic search service. This procedure enters the primary predictors, in stepwise fashion, from the full array of variables considered in the first analysis. Hence, these variables are independent predictors, taking into account the colinearity between variables (e.g., the relationship between age, degree level, and present position or rank).

Results

A large number of common items, assessed for both the industrial and

academic personnel prior to introduction of online search services, was collected. Analysis of these items is presented below, and, as noted above, one objective is to ascertain whether the observed relationship, if any, between these items and subsequent use of online search services is paralleled in both the industrial and the academic setting.

Background Characteristics

Selected demographic and professional background characteristics of the sample, as these factors relate to subsequent use or nonuse of online search services, is shown in Table 2. (See Page 50.)

While the sample includes relatively few women in either the industrial or the academic setting, it would appear that this factor is generally unrelated to subsequent use of online services. On the other hand, consistent with the speculation by Curtis[10] that online search systems would be most heavily used by junior scientists, age is highly related to use, with older persons in either setting least likely to become users.

Not surprisingly, degree level is likewise found to be highly related to subsequent use of online search services. Fully two-thirds of the doctorate-holders, but less than one-third of those holding a degree below this level, used the service in the industrial setting. The relationship in the academic setting is less pronounced, but the doctorate holders and those with less than a Master's (most of whom are advanced level doctoral students who by-pass the Master's degree) are more likely than others to be users.

Of course, some of these foregoing variables, particularly the age and degree level, are related to one's present position. Hence, it is consistent to note that supervisory personnel in the industrial setting are less likely than others to be users. In the academic setting, the most senior faculty

10. Curtis, *op. cit.*

TABLE 2

Background Characteristics of First Year Users of Online Search Services, by Job Setting

	Industrial		Academic	
	Total N=262	Percent Users	Total N=70	Percent Users
Year of Birth*				
Before 1930	80	33.7%	12	50.0%
1930-39	92	40.2	8	87.5
1940 or later	84	50.0	49	75.6
Sex*				
Male	256	41.0	61	72.1
Female	5	60.0	9	77.8
Degree Level*				
Doctorate	84	66.6	42	72.8
Master's	58	31.0	7	57.2
Less than Master's	120	28.3	21	76.2
Field of Highest Degree				
Engineering	66	24.3	--	--
Chemistry (All)	156	45.5	67	71.7
Organic Chemistry	20	80.0	8	62.5
Chemical Engineers	61	31.1	--	--
Other Chemistry	75	48.0	59	72.9
All Other Fields	29	51.8	3	100.0
Present Position*				
Supervisory	68	33.8	--	--
Non-supervisory	194	43.8	--	--
Full Professor	--	--	15	66.7
Other faculty	--	--	10	80.0
Fellow	--	--	4	75.0
Doctoral student	--	--	26	81.8
Other	--	--	15	60.0

*Excludes no response.

(full professors) and those designated as "other" (primarily research associates) are less likely to be users than are faculty of other ranks, doctoral students, and post-doctoral fellows.

Given that the online bibliographic search service was primarily focused on chemical literature, it is not surprising that those trained as engineers (and chemical engineers) were somewhat less likely than others to be users. However, in both settings those trained outside of the areas of chemistry and engineering were somewhat more likely to be users, although their numbers were small. Within subspecialties of the chemistry field, there would appear to be no consistent patterns between the two settings of greater or lesser usage by some specialists than by others.

Information Style

A number of common items on information needs, habits, and appraisal of their utility were asked of all members of both the industrial and academic samples. The relationships between these responses and subsequent use or nonuse of the online search services which were made available are shown in Table 2. (See Page 52-53.)

Our general working hypothesis for these data was that clear relationships would emerge between these variables and subsequent use of online search services, and that these relationships would be consistent between work environments. However, for most of these relationships we did not hypothesize the direction of the relationship, consistent with our generally exploratory objectives of the project. That is, it was assumed that the amount of time one spent in information-seeking, and the methods employed, would clearly relate to subsequent use of online bibliographic search services. If the need for information was high, then one might expect the person to more generally employ online search services, everything else being equal. On the other hand, if present "traditional" means are often employed, and there is general strong satisfaction with these means, there may be less

TABLE 3

Prior Information Styles of First Year Users of Online Search Services, by Job Setting

	Industrial		Academic	
	Total N	Percent Users	Total N	Percent Users
Time per week locating information*				
Four hours or less	138	42.8%	44	68.2%
More than four hours	107	40.2	23	82.5
Time per week in reading professional literature*				
Four hours or less	120	32.5	27	74.1
More than four hours	133	49.6	42	73.8
Time per week in discussion with colleagues*				
Four hours or less	101	47.5	34	76.5
More than four hours	151	38.4	33	75.8
Use of own collection of information*				
Occasionally or less	28	35.7	10	70.0
Frequently	46	45.7	11	73.6
Routinely	188	41.0	48	75.0
Use of literature indexes*				
Never	45	24.4	7	71.4
Seldom or occasionally	138	39.9	17	47.1
Frequently or routinely	78	52.6	34	76.5
Use of standard abstracts/contents*				
Seldom or never	131	32.1	13	77.0
Occasionally	63	41.3	14	64.3
Frequently or routinely	65	58.5	41	73.2
Use of scanning primary sources*				
Occasionally or less	111	24.3	13	61.6
Frequently	63	42.9	18	61.2
Routinely	88	61.4	38	81.6
Use of library browsing*				
Seldom or never	54	20.4	18	72.3
Occasionally	79	39.2	17	82.4
Frequently or routinely	129	51.2	34	67.7

TABLE 3 (continued)

	Industrial		Academic	
	Total N	Percent Users	Total N	Percent Users
Use of citations in other works*				
Occasionally or less	166	31.3	17	47.1
Frequently	51	52.9	24	75.0
Routinely	44	63.6	27	89.9
Present means of locating information is adequate*				
Agree strongly or somewhat	164	39.6	42	66.7
Disagree strongly or somewhat	93	44.1	28	82.2
Present sources are adequate*				
Agree strongly or somewhat	210	43.3	54	68.5
Disagree strongly or somewhat	49	34.7	16	87.5
Present sources too time-consuming to locate*				
Agree strongly or somewhat	85	41.2	35	82.9
Disagree strongly or somewhat	164	42.1	31	64.6
Present sources are up-to-date*				
Agree strongly or somewhat	213	43.2	53	69.9
Disagree strongly or somewhat	38	34.2	16	81.3

*Excludes no response

likelihood to turn to the new innovative means of online search services.

The descriptive data shown in Table 3 generally contribute to a continuation of this ambiguity on the relationship between information style and subsequent use or nonuse of online search services. One series of questions, for example, required the respondents to report on the average number of hours per week spent in information-seeking activities, including reading or professional literature and discussions with colleagues or co-workers. Only small relationships between these time measures and subsequent use of online search services were observed, and patterns were not replicable between the industrial and the academic settings.

For industrial scientists and technologists, those who more frequently or routinely employed their own collection of information, literature indexes, standard abstracts or current contents, and library browsing were more likely to be users of online search services. However, parallel relationships for those in academic settings were not observed for these variables. On the other hand, in both settings, those who most often used citations in other works and who scanned primary sources routinely were substantially more likely than others to also use online search services.

Wide discrepancies between the academic and industrial personnel were likewise observed with regard to their perceptions of the adequacy of current means and sources for information as these related to using online search services. While those in both groups who felt their current means of locating information were inadequate were more likely to be users of online search services, in academic settings those who felt present sources were inadequate, that they were too time-consuming to locate, or that they were not sufficiently up-to-date were more likely to become users, while the reverse was true for these items for those in industrial settings.

Prior Online Experience

In Table 4, we present data on both prior experience and appraisal of

online services with subsequent use of the service when it was introduced in the industrial and the academic settings. Not surprisingly, those in the industrial setting who had used online services in the past, or were familiar with the service, were more likely to continue to use or to begin to use the service. However, for those in the academic setting, there was no clear relationship between prior use or familiarity and subsequent use. For academics, therefore, this may reflect prior negative (or neutral) impact of earlier use, or it may merely reflect that those who were former users of online services continued using their former vendor rather than taking advantage of the project service instituted for this study. Subsequent reports will more directly address questions of these alternative explanations.

The data in Table 4 (see Page 56) clearly show that a more positive attitude toward the potential utility of online services results in more frequently taking advantage of the availability of online search services when such search services are introduced into the work setting. Substantially larger proportions of those who expressed a clear belief that the online service would improve their current information-seeking methods, on the basis of what they had learned prior to the actual introduction of online search services in their work location, were likely to become users over the next year. Similarly, those who expressed generally positive comments to an open-ended question regarding their comments on the potential utility of an online search system to their work were substantially more likely than others to consequently become users of the system.

Multivariate Analysis

Given the high interrelationship between a number of these correlates of use of online search services, the next step was to employ a procedure which would select those factors which have an independent significant relationship with use or nonuse of online services. For each predictor variable listed in

TABLE 4

Prior Online Search Service Use and Evaluation As Related to Current Use of Online Search Services, by Job Setting

	Industrial		Academic	
	Total N	Percent Users	Total N	Percent Users
Ever previously use online services*				
Yes	32	56.2%	17	64.7%
No, but familiar w/service	75	44.0	26	80.8
No, and not familiar w/ service	152	37.5	27	70.4
Frequency of use of online services in prior year*				
Never	242	39.7	57	73.7
Seldom	16	50.0	3	66.7
Occasionally or more	4	100.0	8	75.0
Use of online service thought to improve current method*				
Yes	104	54.8	41	80.5
No/don't know	154	33.2	28	64.3
Other comments re online services*				
Generally positive	117	48.7	31	83.9
Generally negative	15	13.3	2	50.0
Other	56	42.9	16	68.8

*Excludes no response

Tables 2 through 4, the detailed (uncategorized) data (or a series of dummy variables) were employed for regression purposes. All statistically significant variables were allowed to enter freely, in stepwise fashion, as predictors of the criterion measure (use or nonuse). Analyses were conducted separately by work setting, and the results are summarized in Table 5. (See Page 57.)

In neither the academic nor the industrial setting were there many variables that entered the regression equation as significant independent predictors of

TABLE 5

Significant Independent Predictors of Use or Nonuse of Online Search Services Based on Stepwise Multiple Regression Procedures by Job Setting

Job Setting/Variable	zero-order r	step at entry	R	increase in R^2	F value in final equation
<u>Industrial</u>					
Frequency of scanning primary sources	.35	1	.35	.13	24.1
Highest degree: doctorate	.35	2	.44	.07	20.1
Online thought to improve current method	.22	3	.46	.02	15.1
<u>Academic</u>					
Frequency of use of citations in other works	.40	1	.40	.16	6.8
Present sources thought to be inadequate	.27	2	.49	.07	5.4

use of online search services. Moreover, different variables entered the regression equation for each of the two settings. In the industrial setting, the first predictor was a measure of prior information style (frequency of scanning primary sources), followed by degree level (doctorate or not) and favorable attitude to online services prior to project introduction of the service. The resulting multiple R is .46. For the academic setting, only two variables entered the equation, yielding a multiple R of .49. The first was another measure of prior information style (frequency of use of citations in others works), followed by a measure of dissatisfaction in available information resources prior to the introduction of online services.

Conclusion

Despite a broad array of data on personal and professional background, established information styles and appraisal of adequacy of information

resources, and measures of prior attitudes and experience with online search services, the analysis of correlates of who would and who would not use online search services yielded relatively low predictive power. Moreover, there was little similarity, or replicability, between the correlates in one setting (industrial or academic) and the correlates in the other setting. In neither setting, based on a multiple regression model, could as much as 25 percent of the variance (R^2) be explained in subsequent use or nonuse of the online bibliographic search service. Hence, these results tend to confirm the earlier findings of both Curtis[11] and Stern, et. al.[12] regarding generally negligible differences between users and nonusers of computer-readable bibliographic data bases, either online or batch.

Nevertheless, in broad terms, these results do suggest that prior information "style," satisfaction with more traditional information resources, and attitudinal predisposition to the possible utility of online search services, have some small effect on subsequent usage of online services. In later sections, we evaluate these same factors as they might impact on the <u>frequency</u> and <u>type</u> of use of online search services.

<u>Early Versus Late Users</u>

We now look at a subsample of early and late users to address the same policy considerations as for users versus non-users. That is, can we identify distinguishing characteristics of late users in order to develop targeted programs of education to bring these late users in to use a search service sooner if it is appropriate to their needs?

<u>Sample and Methodology</u>

Of the 108 industrial users, 62 (57.4%) used the online search services within the first three months that the system was made available. These

11. Curtis, <u>op</u>. <u>cit</u>.
12. Stern, <u>op</u>. <u>cit</u>.

are identified as early users. Of the academic chemists, 29 of the 51 users (56.9%) were likewise early users.

The first set of analyses relates selected items of questionnaire data to whether the user was an early user (conducted a search within the first three months after the online services were introduced) or came in for his/her first search request at some later time (late user). Basic descriptive statistics, by user type (early and late) are presented for all factors employed in the earlier analyses on users and nonuser; viz., selected demographic and background variables, measures of information "styles" and information needs, and data on prior online search service use and evaluation.

The second set of analyses is based on a multivariate procedure which allows all primary predictor variables to enter a regression equation where the criterion variable is a continuous measure based on the project month of first use of the online search services. This procedure enters the primary predictors, in stepwise fashion, from the full array of variables considered in the first analysis, and shows the amount of increase in explained variance on the criterion measure (month of first use) for each step.

Results

A large number of common items, assessed for both the industrial and academic personnel prior to introduction of a year of free online search services, was collected. Analyses of these items are presented below and emphasis is placed on determining those items which may be the best predictors of early use and to assess whether these same predictors are consistent across settings.

Background Characteristics

Selected demographic and background characteristics of users of the online service, as these factors relate to whether the user was early (first three months) or late (after the first three months) in availing themselves of the services, are shown in Table 6. (See Page 60.)

TABLE 6

Background Characteristics of Early** Users of Online Search Services, by Job Setting

	Industrial		Academic	
	Total Number of Users	Percent Early Users	Total Number of Users	Percent Early Users
Year of Birth*				
Before 1930	27	55.5%	7	71.4%
1930-39	37	56.7	7	71.4
1940 or later	42	61.9	37	78.4
Sex*				
Male	105	57.1	44	77.3
Female	3	66.7	7	71.4
Degree Level*				
Doctorate	56	62.5	31	71.0
Master's	18	61.1	4	75.0
Less than Master's	34	47.1	16	87.5
Field of Highest Degree*				
Engineering	16	37.5	--	--
Chemistry (All)	71	60.6	48	77.1
Organic Chemistry	16	62.5	5	60.0
Chemical Engineers	19	73.7	--	--
Other Chemistry	36	52.8	43	79.1
All Other Fields	15	66.7	3	66.7
Present Position*				
Supervisory	23	56.5	--	--
Non-supervisory	85	57.6	--	--
Full Professor	--	--	10	80.0
Other faculty	--	--	8	37.5
Fellow	--	--	3	100.0
Doctoral student	--	--	21	85.7
Other	--	--	9	77.8

*Excludes no response.

**Early users are defined as those using the service in the first three months.

Inasmuch as the sample includes relatively few women, it is not possible to draw any conclusion regarding sex differences between early and late users. Regarding age, however, the data suggest that not only are older faculty not as likely to use online services (as described elsewhere in this report), but they also are less likely to attempt to employ online services when first introduced even when they do eventually become users.

In the industrial setting, those with post-baccalaureate degrees are more likely than others to be early users. Among the academic users, however, those without yet having a graduate degree are more likely to be early users, indicating that students in particular are likely to be experimentive in attempting new literature search techniques. Indeed, the results show that faculty below the full professor rank are substantially slower to adopt use of the online search services than are those in any other category, despite the fact that these faculty persons are generally more likely than others to be eventual users. In contrast, among the industrial users there is a negligible difference between supervisory and nonsupervisory personnel in their likelihood of being early users. Nor are there clearcut differences between subspecialties in chemistry, replicable across both work settings, which would suggest that scientists and technologists in some aspects of chemistry were more likely than others to be early users.

Information Style

A number of common items on information needs, habits, and appraisal of their utility were asked of all industrial and academic online search service users prior to the introduction of the services. The relationships between these data and subsequent early or late use of the service are shown in Table 7. (See Pages 62-63.)

Surprisingly, for approximately two-thirds of the items shown in Table 2, the general relationship with early vs. late use is not in a consistent direction

TABLE 7

Prior Information Styles of Early** Users of Online Search Services, by Job Setting

	Industrial		Academic	
	Total Number of Users	Percent Early Users	Total Number of Users	Percent Early Users
Time per week locating information*				
Four hours or less	59	62.7%	30	70.0%
More than four hours	43	51.2	19	84.2
Time per week in reading professional literature*				
Four hours or less	39	59.0	20	75.0
More than four hours	66	56.1	31	77.4
Time per week in discussion with colleagues*				
Four hours or less	48	60.4	26	73.1
More than four hours	58	53.4	25	80.0
Use of own collection of information*				
Occasionally or less	10	60.0	7	100.0
Frequently	21	61.9	7	85.7
Routinely	77	55.8	36	69.4
Use of literature indexes*				
Never	11	81.8	5	60.0
Seldom or occasionally	55	54.5	18	66.7
Frequently or routinely	41	53.7	26	88.5
Use of standard abstracts/contents*				
Seldom or never	42	59.5	10	50.0
Occasionally	26	53.8	9	88.9
Frequently or routinely	38	55.3	30	83.3
Use of scanning primary sources *				
Occasionally or less	27	48.1	8	75.0
Frequently	27	51.8	11	81.8
Routinely	54	64.8	31	74.2

TABLE 7 (continued)

	Industrial		Academic	
	Total Number of Users	Percent Early Users	Total Number of Users	Percent Early Users
Use of library browsing*				
Seldom or never	11	45.4%	13	84.6%
Occasionally	31	54.8	14	71.4
Frequently or routinely	66	60.6	23	73.9
Use of citations in other works*				
Occasionally or less	52	53.8	8	75.0
Frequently	27	63.0	18	88.9
Routinely	28	60.7	24	66.7
Present means of locating information is adequate*				
Agree strongly or somewhat	65	53.8	28	75.0
Disagree strongly or somewhat	41	61.0	23	78.3
Present sources are adequate*				
Agree strongly or somewhat	91	56.0	37	78.4
Disagree strongly or somewhat	16	62.5	14	71.4
Present sources too time-consuming to locate*				
Agree strongly or somewhat	35	54.3	29	86.2
Disagree strongly or somewhat	69	59.4	20	65.0
Present sources are up-to-date*				
Agree strongly or somewhat	92	59.8	37	81.1
Disagree strongly or somewhat	13	38.5	13	61.5

*Excludes no response.

**Early users are defined as those using the service in the first three months.

across the industrial and academic settings. To the extent we are seeking generalizations regarding the characteristics of early and late users, these reversals in relationships across settings suggest null results as pertains to most items on prior information styles. For example, in the industrial setting, those users who devote somewhat less time per week to locating information, reading professional literature, and engaging in professional discussion with colleagues are somewhat more likely to be early users of online search services. In comparison, among academic users, those more frequently engaged in these activities are also somewhat more likely to be early users.

For both academic and industrial technologists, those users who most frequently employ their own collection of information are less likely to be early users of online search services. However, unlike the academic chemists, the most probable early users in the industrial setting are those who do not use literature indexes, rarely use standard abstracts, and more frequently scan primary sources, engage in general library browsing, and frequently employ citations in other works.

In both settings, those who indicate that their present means of locating information is less than adequate are slightly more likely to be early users of the online system. However, both the academic and industrial users who believe that their present resources are up-to-date are more likely than others to be early users. Among the industrial scientists and technologists, those who report that present sources are inadequate, but are nevertheless not too time-consuming to locate are slightly more likely to be early users. For the academic chemists, the reverse is true, with those believing that the present sources are adequate but too time-consuming to locate being more frequently early users of online services.

Prior Online Experience

In contrast to the foregoing, there is substantial consistency between

industrial and academic users regarding prior familiarity and appraisal of online search services and subsequent early use of such services when introduced on a free basis in the respective work settings. These relationships are shown in Table 8. (See Page 67.)

Clearly, those users who had at some earlier point in their career used online services were more likely to be early users when they again had an opportunity to access online searching. Of the 18 first-year users of the project services in the industrial setting who had previously used online services, two-thirds were early users; of the 11 experienced academic users who used the project services, 90 percent were early users. Not surprisingly, for both experienced and non-experienced online users, those who thought online searching would be an improvement over their current methods of literature searching, and who otherwise were not negative about online searching capability, were also somewhat more likely to be early users of the project services.

Multivariate Analyses

In the second analytical phase, each predictor variable (uncategorized) listed in Tables 6 through 8 was regressed on the dependent variable, recoded as a continuous variable based on the project month of first use of the online search service. All analyses were conducted separately by work setting, and the results are summarized in Table 9. (See Page 68.)

In the industrial setting, none of the predictors reach statistical significance. Nevertheless, the first three variables to enter the multivariate equation are reported in the Table and, in combination, are shown to predict only a trivial six percent of the variance in the criterion variable (project month of first use).

For the users in the academic setting, only slightly better predictive results are obtained. The first three predictors to enter the stepwise

TABLE 8

Prior Online Search Service Use and Evaluation
As Related to Early** Use of Online
Search Services, by Job Setting

	Industrial		Academic	
	Total Number of Users	Percent Early Users	Total Number of Users	Percent Early Users
Ever previously use online services*				
Yes	18	66.7%	11	90.0%
No, but familiar w/service	33	63.6	21	71.4
No, and not familiar w/service	57	50.9	19	73.7
Frequency of use of online services in prior year*				
Never	96	56.2	42	73.8
Seldom	8	50.0	2	100.0
Occasionally or more	4	100.0	6	83.3
Use of online service thought to improve current method*				
Yes	57	63.2	33	81.8
No/don't know	51	51.0	18	66.7
Other comments re online services*				
Generally positive	57	59.6	26	73.1
Generally negative	2	50.0	1	0.0
Other	24	70.8	11	72.7

* Excludes no response.
** Early users are defined as those using the service in the first three months.

multivariate regression are again shown, although only the first reaches statistical significance. That is, the only statistically significant predictor of month of furst use among project users is academic rank, with assistant and associate professors least likely to be early users.

Conclusion

A broad array of factors, including personal and professional background, established information style, appraisal of adequacy of information

TABLE 9

Primary Predictors of Month of First Use of Online Search Services, Based on Stepwise Multiple Regression Procedures, by Job Setting

Job Setting/Variable	zero-order r	step at entry	R	R^2	level of significance
Industrial					
Frequency of use of literature indexes	.16	1	.16	.02	N.S.
Frequency of use of citations	-.10	2	.22	.05	N.S.
Present sources thought to be up-to-date	.13	3	.26	.06	N.S.
Academic					
Present position faculty, not full professor	.42	1	.42	.18	.001
Frequency of use of literature indexes	-.23	2	.48	.23	N.S.
Frequency of use of citations	.19	3	.53	.28	N.S.

resources, and measures of prior attitudes and experience with online services, were generally found to be inconsequential predictors of who would use online services early and who would use them later. Indeed, even minor, statistically insignificant, relationships were frequently found to not be replicable between industrial and academic setting, further confirming the lack of predictability as to when users might seek online search services.

Of course, these null results cannot be generalized beyond the particular types of background questions analyzed here, nor to different types of populations than the two types of settings (industrial and academic departments)

we analyze here. Other variables, such as type of job task responsibilities and stage of work in one's research project(s), might well be expected to determine when one might seek the capabilities of an online search service.

Nevertheless, in broad terms, these results suggest that we cannot adequately predict which users are more hesitant and which are early adaptors of online search services. In general, the same predictors employed here are likewise weak predictors of who will, and who will not, seek any use whatsoever of online search services.

In conclusion, these results provide little encouragement to the designing of targeted programs, based on the factors reported here, to bring non-users and late users into early exposure and adoption of general use of online search services. These results do, however, demonstrate high proportionate use, and general early use, of online search services by the general community of academic and industrial scientists and technologists when such services are free, well staffed and located in direct proximity to the work environment. As noted later, this general endorsement of the service as reflected through usage rates is sustained after cost factors are introduced and information specialist assistance is curtailed, as reflected by the fact that both the industrial and academic units continued to offer online search services after this research project was terminated.

Frequency of Use

This section, employing the same common set of predictor variables, analyzes the relationships between these variables and frequency of use of the online search services during the first year of the project (i.e., Phase I). The objective of this anlysis is to ascertain whether these factors, determined prior to the introduction of online search services, can aid in planning the estimated demand for such search services when they are made readily available to scientists and technologists in both industrial and in academic

environments. Indeed, in setting up the project services for this study, there was little empirical research available to guide decisions on the establishing of the length of time each day during which the services should be offered, the number of information specialists needed, the number of terminals required to service all requests on demand, or how much demand would vary from day-to-day or as a function of the academic calendar in the case of the academic chemists participating in the project (see the average daily usage charts in the appendix regarding the latter). The following analyses attempt to ascertain the correlates of the frequency with which users of online search services will call upon such services, in order that future efforts to establish online search services in similar environments might better predict, a priori, the demand for such services as related to ascertainable information about potential users prior to introduction of the service.

Sample and Methodology

For the 51 academic chemists who used the project search services, 353 bibliographic searches were conducted in the first year, an average of 6.9 searches per user. Only 5 of the 51 (9.8%) were single-time users during the year. On the other hand, 9 (17.6%) were extremely heavy users of the system, conducting 10 or more searches during the year.

A total of 345 searches were conducted for the 108 industrial users during the first year, for an average of 3.2 searches per user. Fully two-fifths (41.9%) of the 108 users were single time users only. A small proportion (5.5%), 6 out of the 108 scientists and technologists, were heavy users with 10 or more searches during the first year of the project.

Consistent with previous analyses, two distinct research strategies were employed. The first analysis presents basic descriptive data on frequency of use by each of the three sets of common background date for the academic

and industrial users: (1) demographic (age, sex), professional training (degree level and field of formal training), and present professional position; (2) established information "styles" and appraisal of adequacy of informational resources; and (3) prior online search service use and evaluation.

The second analysis employed a multivariate procedure which allows all statistically significant background variables to enter a predictive equation where the criterion (dependent) variable is the number of searches the user requested and had executed during the first year of the project. This procedure was conducted separately for the academic chemists and for the industrial scientists and technologists. In both cases, the procedure selected the primary predictors of frequency of use and entered them in stepwise fashion until no additional factors from the full array of background variables could significantly add to the amount of explained variance in the dependent variable.

<u>Results</u>

Analyses of the relationship between each of the common pool of items, ascertained prior to the introduction of online bibliographic search services, and subsequent frequency of use of the search service, are shown below. All analyses are reported separately by work setting (industrial or academic), and one objective is to ascertain the degree to which the correlates of usage rates are generalizable across work settings.

<u>Background Characteristics</u>

The set of demographic and professional background characteristics of the users of the online search services, as these characteristics relate to the frequency of usage, are shown for the academic chemists in Table 10 and for the industrial scientists and technologists in Table 11. (See Pages 72 and 73.))

TABLE 10

Background Characteristics of First Year Users of Online Search Services, by Frequency of Use: Academic Setting

	Total Number of Users	Frequency of Use (Percentages) Single Time User	Light User (2-4 times)	Medium User (5-9 times)	Heavy User (10 or more times)
Year of birth*					
Before 1930	7	0.0%	57.1%	42.9%	0.0%
1930-39	7	28.6	42.9	0.0	28.6
1940 or later	37	8.1	37.8	35.1	18.9
Sex*					
Male	44	11.4	40.9	31.8	15.9
Female	7	0.0	28.6	42.9	28.6
Degree level*					
Doctorate	31	12.9	38.7	29.0	19.4
Master's	4	0.0	25.0	75.0	0.0
Less than Master's	16	6.2	43.8	31.3	18.7
Field of highest degree*					
Chemistry (All)	48	10.4	35.4	35.4	18.7
Organic chemistry	5	0.0	20.0	40.0	40.0
Other chemistry	43	11.6	37.2	34.9	16.3
All other fields	3	0.0	100.0	0.0	0.0
Present position*					
Full Professor	10	10.0	40.0	40.0	10.0
Other faculty	8	25.0	25.0	25.0	25.0
Fellow	3	0.0	66.7	0.0	33.3
Doctoral student	21	9.5	47.6	38.1	14.3
Other	9	0.0	44.4	33.3	22.2

*Excludes no response.

TABLE 11

Background Characteristics of First Year Users of Online Search Services, by Frequency of Use: Industrial Setting

	Total Number of Users	Frequency of Use (Percentages) Single Time User	Light User (2-4 times)	Medium User (5-9 times)	Heavy User (10 or more times)
Year of birth*					
Before 1930	27	51.8%	22.2%	25.9%	0.0%
1930-39	37	37.8	48.6	5.4	8.1
1940 or later	42	35.7	40.9	26.2	7.1
Sex*					
Male	105	41.9	36.2	17.1	4.8
Female	3	0.0	0.0	66.7	33.3
Degree level*					
Doctorate	56	30.4	35.7	25.0	8.9
Master's	18	27.8	55.6	16.7	0.0
Less than Master's	34	64.7	23.5	8.8	2.9
Field of highest degree*					
Engineering	16	56.3	37.6	6.2	0.0
Chemistry (all)	71	36.6	33.8	22.5	7.0
Organic chemistry	16	31.3	50.0	18.7	0.0
Chemical engineers	19	42.1	21.0	36.8	0.0
Other chemistry	36	36.1	33.3	16.7	13.9
All other fields	15	46.7	[illegible].3	13.3	6.7
Present position*					
Supervisory	23	34.8	43.5	21.7	0.0
Non-supervisory	85	42.3	32.9	17.6	7.1

*Excludes no response.

While the samples include relatively few women (7 users in the academic setting and 3 users in the industrial setting), they were substantially more likely than their male counterparts to be frequent users. None of the users who were women used the services only once, and about three-fourths of the women in the academic department and all of the women in the industrial setting

conducted five or more searches during the year.

With regard to age, and consistence with earlier findings which show that older scientists and technologists are less likely to use online search services and to use them later rather than sooner after introduction if they do become users, older persons are also less likely to become heavy users of the online computer readable bibliographic search services. One obvious explanation of these consistent findings regarding age is that older scientists and technologists are more resistant than younger persons to new innovative techniques for literature searching. However, an alternative explanation, discussed in a later section of this report, may be that the more senior persons have additional resources and technical assistance available to them which allows them to delegate literature searching to their more junior associates.

However, the data in Tables 1 and 2 as pertains to degree level run counter to the latter explanation. That is, the doctorate holders in the industrial setting are not only more likely than others to be users of online searching but they are also significantly more likely to be frequent users. In the academic setting, there are less clearcut differences in frequency of use by degree level, with no statistically significant difference among the 51 users. Similarly, in both settings there are no clear discernible differences in the frequency of use as a function of one's present position.

Not surprising, given the data bases available in the project's online searching system, those users whose formal training was outside of chemistry tended to be somewhat less frequent users of the system. Among the chemists, however, there was no consistent pattern of frequency differences between the industrial and the academic users as related to their area of specialization in the field of chemistry.

Information Style

Data on the frequency of online search use as related to the information needs, habits, and appraisal of the utility of traditional information resources for the academic and industrial scientists and technologists are shown in Tables 12 and 13 respectively. (See Pages 76-79.)

No clearcut patterns, replicable across work settings, were found between frequency of use and the average amount of time the scientists and technologists devoted to locating information, to reading professional literature, and to discussion with colleagues.

In both settings, the data suggest that those who more frequently use literature indexes, standard abstracts and current contents, and who more routinely scan primary sources and use library browsing for informational purposes, are also more likely to be frequent users of online bibliographic search capabilities. In contrast, however, among the academics, those who most frequently use citations in other works and routinely use their own collection of information are substantially less likely to become frequent users of online search services, while the opposite tends to be true for the industrial scientists and technologists.

The last four items shown in Tables 12 and 13 pertain to the evaluation of the adequacy of existing information resources as related to subsequent frequency of use of online search services. Again, no consistent patterns emerge, generalizable across both the academic and industrial settings, which would suggest a robust relationship between the amount of usage of online search services and the individual's appraisal of the adequacy of existing traditional literature search capabilities in their work environment.

Prior Online Experience

Prior to the introduction of project online search services in the academic and industrial settings, a number of the eventual users had prior

TABLE 12

Prior Information Styles of First Year Users of Online Search Services, by Frequency of Use: Academic Setting

	Total Number of Users	Frequency of Use (Percentages) Single Time User	Light User (2-4 times)	Medium User (5 [illegible] ti[illegible]	Heavy User (10 or more times)
Time per week locating information*					
Four hours or less	30	16.7%	26.7%	30.0%	26.7%
More than four hours	19	0.0	63.2	31.6	5.3
Time per week in reading professional literature*					
Four hours or less	20	10.0	35.0	35.0	20.0
More than four hours	31	9.7	41.9	32.3	16.1
Time per week in discussion with colleagues*					
Four hours or less	26	15.4	34.6	34.6	15.4
More than four hours	25	4.0	44.0	32.0	20.0
Use of own collection of information*					
Occasionally or less	7	0.0	42.9	28.6	28.6
Frequently	7	0.0	14.3	57.1	28.6
Routinely	36	13.9	33.3	27.8	13.9
Use of literature indexes*					
Never	5	20.0	40.0	40.0	0.0
Seldom or occasionally	18	11.1	33.3	27.8	27.8
Frequently or routinely	26	3.8	46.1	34.6	15.4
Use of standard abstracts/contents*					
Seldom or never	10	20.0	30.0	50.0	0.0
Occasionally	9	0.0	33.3	33.3	33.3
Frequently or routinely	30	6.7	46.7	26.7	20.0
Use of scanning primary sources*					
Occasionally or less	8	12.5	25.0	50.0	12.5
Frequently	11	0.0	54.5	36.4	9.1
Routinely	31	12.9	38.7	25.8	22.6

TABLE 12 (continued)

	Total Number of Users	Frequency of Use (Percentages) Single Time User	Light User (2-4 times)	Medium User (5-9 times)	Heavy User (10 or more times)
<u>Use of library browsing*</u>					
Seldom or never	13	15.4	53.8	15.4	15.4
Occasionally	14	7.1	35.7	35.7	21.4
Frequently or routinely	23	8.7	34.8	39.1	17.4
<u>Use of citations in other works*</u>					
Occasiona-ly or less	8	12.5	37.5	12.5	37.5
Frequently	18	5.5	44.4	38.9	11.1
Routinely	24	12.5	37.5	33.3	16.7
<u>Present means of locating information is adequate*</u>					
Agree strongly or somewhat	28	7.1	32.1	39.3	21.4
Disagree strongly or somewhat	23	13.0	47.8	26.1	13.0
<u>Present sources are adequate*</u>					
Agree strongly or somewhat	37	8.1	37.8	32.4	21.6
Disagree strongly or somewhat	14	14.3	42.9	35.7	7.1
<u>Present sources too time-consuming to locate*</u>					
Agree strongly or somewhat	29	3.4	44.8	34.5	17.2
Disagree strongly or somewhat	20	20.0	30.0	30.0	20.0
<u>Present sources are up-to-date*</u>					
Agree strongly or somewhat	37	8.1	37.8	32.4	24.3
Disagree strongly or somewhat	13	23.1	46.1	30.8	0.0

*Excludes no response.

TABLE 13

Prior Information Styles of First Year Users on Online Search Services, by Frequency of Use: Industrial Setting

	Total Number of Users	Frequency of Use (Percentages) Single Time User	Light User (2–4 times)	Medium User (5–9 times)	Heavy User (10 or more times)
Time per week locating information*					
Four hours or less	59	39.0%	32.2%	23.7%	5.1%
More than four hours	43	44.2	34.9	13.9	7.0
Time per week in reading professional literature*					
Four hours or less	39	56.4	28.2	12.8	2.6
More than four hours	66	33.3	36.4	22.7	6.1
Time per week in discussion with colleagues*					
Four hours or less	48	43.8	29.2	25.0	2.1
More than four hours	58	37.9	39.6	13.8	8.6
Use of own collection of information*					
Occasionally or less	10	50.0	50.0	0.0	0.0
Frequently	21	38.1	28.6	33.3	0.0
Routinely	77	40.2	35.1	16.9	7.8
Use of literature indexes*					
Never	11	9.1	54.5	36.4	0.0
Seldom or occasionally	55	49.1	34.5	12.7	3.6
Frequently or routinely	41	59.0	29.3	21.9	9.8
Use of standard abstracts/contents*					
Seldom or never	42	52.4	30.9	14.3	2.4
Occasionally	26	46.2	23.1	23.1	7.7
Frequently or routinely	38	26.3	44.7	21.0	7.9
Use of scanning primary sources*					
Occasionally or less	27	48.1	33.3	14.8	3.7
Frequently	27	37.0	37.0	25.9	0.0
Routinely	54	38-9	35.2	16.7	9.2

TABLE 13 (continued)

	Total Number of Users	Frequency of Use (Percentages) Single Time User	Light User (2-4 times)	Medium User (5-9 times)	Heavy User (10 or more times)
Use of library browsing*					
Seldom or never	11	36.4	45.4	18.2	0.0
Occasionally	31	38.7	38.7	22.6	0.0
Frequently or routinely	66	42.4	31.8	16.7	9.1
Use of citations in other works*					
Occasionally or less	52	51.9	36.5	9.6	1.9
Frequently	27	29.6	33.3	29.6	7.4
Routinely	28	32.1	32.1	25.0	10.7
Present means of locating information is adequate*					
Agree strongly or somewhat	65	43.1	32.3	20.0	4.6
Disagree strongly or somewhat	41	39.0	39.0	14.6	7.3
Present sources are adequate*					
Agree strongly or somewhat	91	38.5	38.5	18.7	4.4
Disagree strongly or somewhat	16	[illegible]	12.5	18.8	12.5
Present sources too time-consuming to locate*					
Agree strongly or somewhat	35	37.1	45.7	5.7	11.4
Disagree strongly or somewhat	69	43.5	29.0	24.6	2.9
Present sources are up-to-date*					
Agree strongly or somewhat	92	40.2	38.0	18.5	3.3
Disagree strongly or somewhat	13	53.8	7.7	15.4	23.1

*Excludes no response

experience and/or opinions with r[illegible] to online bibliographic searching. The relationships between these factors and subsequent frequency of use of the project online search services are shown in Tables 14 and 15 for the academic and the industrial scientists and technologists respectively. (See below and Page 81.)

TABLE 14

Prior Online Search Service Use and Evaluation as Related to Current Use of Online Search Services, by Frequency of Use: Academic Setting

	Total Number of Users	Frequency of Use (Percentage) Single Time User	Light User (2-4 times)	Medium User (5-9 times)	Heavy User (10 or more times)
Ever previously use online services*					
Yes	11	0.0%	9.1%	54.5%	36.4%
No, but familiar w/service	21	4.8	47.6	28.6	19.0
No, and not familiar w/service	19	21.0	47.4	26.3	5.3
Frequency of use of online services in prior year*					
Never	42	11.9	45.2	28.6	14.3
Seldom	2	0.0	50.0	50.0	0.0
Occasionally or more	6	0.0	0.0	50.0	50.0
Use of online service thought to improve current method*					
Yes	33	6.1	36.4	33.3	24.2
no/don't know	18	16.7	44.4	33.3	5.5
Other comments re online services*					
Generally positive	26	15.4	30.8	26.9	26.9
Generally negative	1	0.0	0.0	100.0	0.0
Other	11	0.0	45.5	36.4	18.2

*Excludes no response

TABLE 15

Prior Online Search Service Use and Evaluation as Related to Current Use of Online Search Services, by Frequency of Use: Industrial Setting

	Total Number of Users	Frequency of Use (Percentages)			
		Single Time User	Light User (2-4 times)	Medium User (5-9 times)	Heavy User (10 or more times)
Ever previously use online services*					
Yes	18	27.8%	27.8%	33.3%	11.1%
No, but familiar w/service	33	21.2	51.5	21.2	6.1
No, and not familiar w/service	57	56.1	28.1	12.3	3.5
Frequency of use of online services in prior year*					
Never	96	42.7	35.4	17.7	4.2
Seldom	8	25.0	37.5	25.0	12.5
Occasionally or more	5	[illegible]	25[illegible]	25.0	25.0
Use of online service thought to improve current method*					
Yes	57	33.3	33.3	22.8	10.5
No/don't know	51	49.0	35.3	13.7	0.0
Other comments re [illegible] services*					
Generally positive	57	35.1	28.1	26.3	10.5
Generally negative	2	50.0	50.0	0.0	0.0
Other	24	20.8	66.7	12.5	0.0

*Excludes no response

In both settings, those who had ever previously used online search services, or were familiar with such services, were more likely than others to be heavy users of the project services. Among the 10 users (6 in the academic setting and 4 in the industrial setting) who reported that they were at least occasional users of online search services in the year proceding introduction of the project online services, all of the academic users and half of the industrial users conducted at least 5 searches during the first year of the project.

For both the academic and the industrial samples, those who were generally positive toward the introduction of online search capabilities and who thought that such services might definitely be an improvement over their traditional methods of literature searching were not only more likely to be users and to use the system early, as reported previously, but they were also more likely to be heavy users, conducting 10 or more separate searches during the first year after introduction of the project services.

Multivariate Analyses

As a second step in the analyses, each predictor variable (uncategorized) which was assessed above was regressed against a continuous variable reflecting the actual number of online bibliographic searches which each user conducted during the first year after introduction of the search service. Each predictor variable which attained statistical significance was allowed to freely enter the prediction equation, in stepwise fashion. The analyses were conducted separately by work setting, and the results are summarized in Table 16.

TABLE 16

Significant Independent Predictors of Number of Online Searches by Users, Based on Stepwise Multiple Regression Procedures, by Job Setting

Job Setting/Variable	zero-order r	step at entry	R	increase in R^2	F value in final equation
Industrial					
Frequency of use of online services in prior year	.28	1	.28	.08	6.7
Highest degree doctorate	.26	2	.35	.04	4.1
Academic					
Frequency of use of own collection of information	-.32	1	.32	.10	4.2

In neither the academic nor the the industrial setting were there many variables that entered the regression equation as significant independent predictors of frequency of use of online bibliographic searching. Moreover, different variables entered the regression equation for each of the two settings, suggesting a lack of capability to generalize the findings across the two types of work environments.

In the industrial setting, the first significant predictor of frequency of use was the frequency of use of similar capabilities in the year prior to introduction of the project services. The only other variable which entered the equation was the academic degree level of the user, with doctorate-holders significantly more likely than others to be frequent users of the service in the industrial setting. The resulting multiple R with these two variables is .35, which explains 12 percent of the variance in the frequency of use among users who are industrial scientists and technologists.

For the academic chemists, only one statistically significant predictor variable enters the equation, explaining 10 percent of the variance. This variable is a measure of the degree to which the user formerly relied on his own collection of information for literature searching. The resulting statistically significant relationship was found to be negative, with those least likely to employ their own collection of information being most likely to frequently use bibliographic online search services.

Conclusion

The common set of predictor variables assessing personal and professional background, established information styles and appraisal of adequacy of information resources, and measures of prior attitudes and experience with online search services which were previously found to be weak predictors of who would use online services and who would use them eraly, were also found to be relatively poor predictors of the frequency with which users

would call upon online search services for their literature search needs. Indeed, only one statistically significant correlate of the frequency of use of online services was found for the academic chemists, and only two significant correlates emerged for the industrial scientists and technologists.

These resulting weak relationships, based on the types of variables analyzed here, suggest that knowledge of such factors cannot aid sufficiently in planning the likely level of demand for online search services when such a capability is newly introduced into a work setting. However, the substantial differences in rates of use and frequency of use between an industrial setting and an academic setting suggest that demand expectancies cannot be generalized across settings. That is, in the industrial setting, among all professional personnel--including scientists and technologists and both supervisory and nonsupervisory personnel--well under half will not use the system at all during the first year; and many who do become users will only do so well after the service is first introduced, and on average will use the service relatively infrequently (3.2 searches per year per user). In comparison, among academic chemists--inclusive of faculty, advanced doctoral students, research associates and fellows--about three-fourths will use the service in the first year; and will tend to use it more quickly and more than twice as frequently as industrial scientists and technologists.

PHASE I - ANALYSIS OF USE RECORDS

For Phase I (free, mediated searches) the 353 uses by academic users and 345 uses by industrial users were analyzed. For each use an Information Specialist's Record (pages 261-2) and a User Reaction Form (pages 263-4) were completed.

An overview is first presented of the academic and industrial uses, followed by a comparison of academic and industrial uses. Then academic and industrial uses are analyzed in terms of the following use characteristics:

Time of use: Early - first three months
Late - subsequent

Frequency of use by individual user:
Light - 1-4 uses
Medium - 5-9 uses
Heavy - 10 or more uses

Calendar age (date of birth) of user:
Before 1930
1930 - 1939
1940 - 1949
1950 or later

Professional age of user (date received highest degree):
Before 1960
1961 - 1970
1971 - 1977

Position of user:
For faculty users:
Faculty
Post-doctoral fellow or research associate
Graduate student

For industrial user:

Supervisor

Non-supervisor

<u>Type of approach</u>: Current awareness

Exhaustive

A few references or browsing

Facts or procedures

Statistically significant differences of 0.05 or higher, based on chi square tests, are discussed when they appear to have a bearing on use characteristics. This is followed by a table of significant differences for the factors compared. The discussion are of <u>uses</u> by specific groupings rather than of users. For example, the heavy uses category represents 101 uses by users who made 10 or more uses of the system. For ease of reading "fewer or more uses" refers to statistically significant higher or lower percentage of use.

<u>Overview of Academic Uses</u>

N = 353.

Over nine out of ten search requests were received in person, with about six out of ten requests being received in writing, either instead of or in addition to being received in person. No requests were received by phone. About 8 percent were requests received from other than the final user. About seven out of ten requests were for new searches, with the remaining requests about equally divided between continuation and modification of previous searches. In about four out of ten uses, the users of the information supplied synonyms. In about two out of every ten searches the user of the information supplied search logic. Search constraints were requested for English language publications only for about one out of 100 searches, for authors (either with or without subject terms) in about one out of five uses,

while only about two out of 100 uses specified a maximum number of publications wanted and about one out of ten uses specified a date constraint. Fewer than five out of 100 uses specified a journal title, the name of an organization, the title of a journal article, or review articles as constraints. About nine out of ten searches had as primary purpose the support of a research project. The remaining searches were primarily for teaching, either directly or indirectly related to specific courses. In terms of types of approaches, about half of the searches used an exhaustive approach and about a fifth of the searches were for a few references on a topic. About one out of seven was for current awareness, and about one out of seven was for specific facts or procedures.

The purpose of the searches was to stay current in the user's area of research in over half of the searches; to stay current in related areas in about one out of six uses; for brushing up on a topic in about one out of ten uses; for learning a new specialty in about one out five uses; and for supporting on-going work with theory (one out of five uses), specific facts (one out of three uses), procedures, and approaches or methodology (one out of four uses).

Other purposes mentioned were preparation for an internal meeting (one out of twenty uses), preparation for an internal report (one out of 100 uses), preparation for a paper or publication (one out of three uses), preparation of a dissertation (one out of five uses), and preparation of grant proposals (about one out of twenty uses). Purposes of use choices are not mutually exclusive and more than one was checked in a number of instances.

Prior to using the online search service about one out of four users conducted a search of printed indexes, one out of 100 made use of online search aids such as lists of keywords, one out of three searched his personal

document collection and about one out of four discussed his need for information with colleagues. As to data bases searched, CHEMCON was used 98 times out of 100, CHEM7071 was used one time out of four. The remaining data bases were used less than one time out of ten. The totals add up to more than 100% because of multiple data base use.

The number of search statements per use feel into approximately four equal groups of 1-3, 4-7, 8-12, and 13 or more search statements per use. The number of online printed citations also fell into four approximately equal groups from 0-3, 4-10, 11-20, and 21 or more citations printed online per use. Somewhat more than one out of three uses had offline printed citations. Connect time per search also fell into approximately four equal time ranges of from one to seven minutes, 8-13 minutes, 14-23 minutes, and 24 or more minutes. About one out of ten uses required no negotiation time and one out of every three uses required four or more minutes of negotiation time. The remaining uses required between one and three minutes of negotiation.

The user was present and interacted with the system in seven out of every ten searches. One out of every three searches required post-search staff time. One out of four searches had technical problems which caused delays.

Users were unfamiliar with every relevant and retrieved citation in about three out of ten searches but knew of relevant and non-retrieved citations in about four out of ten uses.

In terms of users' opinions of search output, about two out of three commented that the size of the output was just about right, over eight out of ten considered the currency of the output either satisfactory or very satisfactory and over seven out of ten considered the utility of the search output either satisfactory or very satisfactory.

Overview of Industrial Uses

N = 345

About two out of three search requests were received in person, with about one out of four being received in writing or in writing as well as in person. About one out of six requests were received by phone. Only about two out of 100 uses were received by other than the final user of the search results. About two out of every three searches were new searches, with the remainder being continuations or modifications of previous searches. Synonyms were supplied by the user in over half of the searches and search logic in about one out of six searches.

As to search constraints, about two out of 100 search constraints had an English only constraint, about seven out of 100 searches had an author constraint (either an author search or a subject search with author(s) specified). About six out of 100 searches had a type of publication constraint. About three out of 100 searches specified a maximum number of citations wanted. Only one out of 100 searches had a date of publication constraint.

For types of searches, one out of three was exhaustive, one out of six was for a few references on a subject, one out of three was for specific facts and procedures, and about one out of ten was for current awareness.

The purpose of the search, a non-mutually exclusive choice as was already indicated, was to stay current in the user's area of interest (about four out of ten uses, as has already been indicated in the discussion of academic uses), to stay current in a related area (about one out of ten uses), brushing up (about one out of eleven uses), learning a new specialty (one out of five uses), support of ongoing project with theory (one out of eight uses), with facts (one out of five uses), support of ongoing project with theory (one out of eight uses), with facts (one out of four uses), with procedures, apparatus or methodology (one out of two uses), the preparation for internal

meetings (three out of 100), the preparation of internal reports (five out of 100), the preparation of patent applications (one out of 100), the preparation of publications or papers (five out of 100).

About one out of four online search requests was preceded by searches of printed indexes. About four out of 100 searches were preceded by use of online system search aids, about four out of ten by users searching their own collection of documents, and in about four out of ten uses by discussions with colleagues. Data bases searched were CHEMCON (over eight out of ten uses), CHEM7071 (about three out of ten uses), COMPENDEX (one out of ten uses), NTIS (four out of 100) with all others being used five times out of 100.

About one out of three uses required 13 or more search statements, one out of eight required one to three search statements with the remaining searches requiring four to twelve search statements. Only six out of 100 searches had more than 20 online printed citations, and about a third of the searches had zero to three online printed citations with the remaining searches having four to twenty online printed citations. About two out of three searches had offline printed citations.

About one out of five searches required more than 23 minutes of computer connect time and one out of five searches required one to seven minutes of connect time with the remaining searches requiring eight to twenty-three minutes of connect time.

The user was present and interacted in somewhat less than half of the time. Technical difficulties delaying searches occurred about one time out of six. As to users' reactions, about four out of ten were unfamiliar with any of the relevant and retrieved citations but over half noticed the absence of relevant documents in the output. About two out of three considered the search output of just about the right size. About eight out of ten considered

the currency of the output satisfactory or very satisfactory, and about three out of four considered the utility of the search output satisfactory or very satisfactory.

Comparison of Academic and Industrial Uses

Academic uses N = 353

Industrial uses N = 345

More academic searches were received in person and more academic users interacted with the system during the search than was true for industrial searches. This may have been due, in part, to the more convenient location of the academic search office (located centrally in the one building where most of the users have their offices and laboratories) and, in part, to the academic users' greater need to interact with the literature during the search. This probably explains why no academic search requests were received by phone. However, more academic searches were requested by someone other than the final user of the search results. This may have been so because of graduate students requesting searches for their professors and for other students not in the sample.

Industrial users supplied synonyms more of the time. This cannot be explained on the basis of data base searched since both groups made greatest use of CHEMCON and CHEM7071, a data base without vocabulary control. Academic users had more author and time constraints but fewer constraints by type of publication. The greater use of search constraints may be an indication of either greater need for more specific searches and/or greater skill in the use of the system. Since data on this point are not consistent, no conclusion may be drawn.

In terms of types of approaches, more academic uses were for exhaustive searches, explainable in part by the greater number of searches for dissertations and grant proposals. There were also more academic uses for a few

references on a topic or browsing, perhaps due to the convenient location of the search office but there were fewer academic uses for specific facts or procedures. This may be explained by the availability of other information sources in an academic environment--the colleagues or the professors who have the information. More academic users had as their purpose staying current in either the user's area of interest or in related areas, to prepare publications or papers, and to support work on a project with facts or theory. Fewer academic uses were for procedures, apparatus, or methodology, for internal reports, and for patent applications. The latter two can be explained by a lesser need for internal reporting and patent applications in an academic environment.

Fewer academic users used search aids such as lists of terms prior to requesting a search. This may either be explained by their greater familiarity with the vocabulary for their search or on greater reliance on the information specialist to do this task. The fact that fewer academic users discussed their search with co-leagues prior to requesting an online search may be due to the graduate student users who have not had a chance to establish colleagues. Academic users made greater use of CHEMCON either singly or in combination with other data bases and made lesser use of COMPENDEX and NTIS. This is not surprising since all academic users were chemists while industrial users included scientists in other disciplines and engineers. Academic users used fewer search statements on the average, retrieved more citations online and had more searches without offline citations. These search characteristics may be attributed to the more frequent presence of the final user during the search and his interaction during the search. Academic users had more technical problems in terms of log on and delay during the search, explained in part to the use of a T33 teletypewriter terminal during the early months of the search.

Academic users retrieved more documents with which they were familiar.

Since there was no difference in frequency of use of printed indexes prior to the search, this difference may be attributed to the academic users' greater familiarity with the literature. This conclusion is strengthened by the fact that more searches for academic users did not retrieve documents with which the users were familiar and that should have been retrived. Academic users were more satisfied with the currency of the search output but equally satisfied with its size and utility.

TABLE 17

Academic versus Industrial Uses

Item	Academic	Industrial	Significance
Search request received			
In writing	60.6	23.2	.001
In person	91.2	67.8	.001
By phone	0.0	15.9	.001
By other than final user	7.9	2.3	.002
User assistance			
Synonyms supplied	43.5	56.8	.003
Search constraints			
Author	19.9	6.7	.001
Publications	0.0	5.8	.001
Time period	11.3	1.2	.001
Other	5.7	1.2	.003
Other, patents	0.0	3.5	.001
Other, excluding patents	0.0	1.4	.001
Primary application			
Dissertation	20.1	0.6	.001
Grant proposal	5.7	0.0	.001
System test	0.3	0.9	.001
Technical report	0.0	0.3	.001
Other	12.7	8.1	.001
Type of approach			
Exhaustive	49.6	33.3	.001
A few references, browsing	22.1	13.6	.001
Specific facts, procedures	13.9	39.1	.001
Purpose of use			
Stay current, own area	52.7	40.6	.002
Stay current, related area	16.8	10.4	.03
Supporting project--theory	18.7	12.5	.04
Supporting project--facts	36.3	25.1	.002
Supporting project--procedures	24.6	53.0	.001
Preparation for			
Internal report	0.8	4.6	.005
Patent application	0.0	1.7	.04
Publication	32.6	15.2	.001
Sources used prior to search			
Online system aids	0.8	3.5	.04
Discuss with colleagues	22.7	38.3	.001

TABLE 17 (continued)

Item	Academic	Industrial	Significance
Number of search statements			
1-3	28.0	12.5	.001
4-7	26.6	29.0	.001
8-12	24.4	24.6	.001
13+	21.0	31.6	.001
Files searched			
CHEMCON	94.6	83.5	.001
COMPENDEX	0.3	10.1	.001
NTIS	0.3	4.3	.001
Citations printed			
Online			
0-3	26.1	36.8	.001
4-10	23.8	37.1	.001
11-20	24.9	20.0	.001
21+			
Offline			
0	63.7	36.8	.001
1+	36.3	63.2	.001
User present for search			
In person	70.0	44.6	.001
By phone	0.0	1.7	.001
User interaction with search	71.1	43.2	.001
Technical problems--delay	23.8	17.4	.003
Technical problems--log-on	10.8	1.7	.001
Citations			
Number already familiar			
1-2	19.5	12.2	.003
3-7	19.5	14.8	.003
7+	30.3	31.6	.003
Number not retrieved			
0	58.1	43.5	.001
1+	41.9	56.5	.001
Opinion on citation currency			
Very satisfactory	43.9	34.8	.02
Satisfactory	43.1	49.3	.02
Unsatisfactory	1.1	3.2	.02
Highly unsatisfactory	0.3	1.7	.02

Time of Use by Academic Users

Early Use - First three months of use; N=101

Late Use - Subsequent months of use; 4-11 months of use; N=252

The later uses tend to be repeat uses, with only 14 out of 51 later uses being requested by initial users of the system. Most search requests were received in person, but there were fewer search requests received in person for later uses. Few searches were received by other than the final user of the information but the number of such requests by other than the final user was higher for the later uses. Both of these differences in later uses may be due to one or a combination of the following factors.

The novelty effect of watching a search being performed might have worn off. Also, the later user might consider himself sufficiently familiar with the system to use it without being present. This, however, may not be a permanent attitude since somewhat more knowledge of the system might persuade the user that interaction with the system is highly desirable.

The later user who did not come to the system in person may be a user who has graduate assistants to delegate searches to. For the analysis of uses by position, it was found that fewer faculty were present and interacting during the search.

Later searches showed greater use of search constraints, such as author or time period constraints, and this may have been due to increased familiarity with the system's options. Most searches listed research as the primary application of search results but later uses listed more searches for other than research applications. This may also be an indication that when users become familiar with what the system can do, they use it for a greater variety of tasks. The wider application of search results is also reflected by an increased number of later uses for different purposes related to research projects such as keeping current in related areas, learning a new specialty,

looking for references on theoretical aspects of a project, obtaining information procedures, apparatus or methodology, and assistance in preparing for internal meetings and in writing grant proposals.

A higher number of later users used CHEMCON either in addition to or instead of other bibliographic data bases. The amount of time spent on search negotiation went down for later uses, probably an indication of more efficient negotiation (less time spent on explaining the system) with experience.

The amount of computer connect time and post-search staff time per search also went down for later uses, again a probably indication of more efficient searching with experience on the part of both the user and the information specialist. There was no significant difference between early and late uses' user feedback on output size, currency, or utility.

Conclusions that may be drawn for a comparison of early and late uses are that with experience more efficient use is made of the system, that the system is used more extensively for different types of purposes, and that more of the system options are used.

TABLE 18

Time of Use by Academic Users

Item	Early N=101	Late N=252	Significance (less than or = to .05)
Search request received			
In person	97.0%	88.9%	.03
By other than final user	3.0	9.9	.05
Search constraints			
Author	11.0	23.5	.02
Time period	3.0	14.7	.004

TABLE 18 (continued)

Item	Early N=101	Late N=252	Significance (less than or = to .05)
Primary applications			
Research	95.0	81.0	.002
Other—course related	10.0	90.0	
Other--not course related	13.3	86.7	
Purpose of use			
Keep current, related areas	6.0	21.0	
Learn new specialty	5.9	25.4	.001
Supporting project work—theory	8.9	22.6	.005
Supporting project work--procedures	10.9	30.2	.001
Preparing for internal meetings	0.0	6.7	.02
Dissertation	19.8	20.2	.001
Grant proposal	2.0	7.1	.001
Testing system	1.0	0.0	.001
Other	1.0	17.5	.001
File searched			
CHEMCON	87.1	97.6	.001
Negotiation time (minutes)			
0-1	18.8	32.9	.04
2-3	24.8	25.8	.04
4+	42.6	30.2	.04
Terminal connect time (minutes)			
1-7	15.8	24.6	.001
8-13	20.8	31.3	.001
14-23	22.8	25.4	.001
24+	40.6	18.7	.001
Post-search staff time with user (minutes)			
0-1	31.7	23.0	.001
2+	22.8	9.1	.001

Time of use by industrial users

Early use (first three months; N=52 uses)

Late use (subsequent use; N=293 uses)

Later searches included fewer search modifications but more new searches and more continuations of prior searches. The smaller number of search modifications may be attributable to greater skill on the part of the information specialist in conducting the search as well as greater sk-ll on the part of the user in requesting the needed searches. Fewer of the later searches were exhaustive searches, perhaps because of the user's realization of the utility of the online system for other types of approaches. More of the later searches were done for staying current in the user's area of specialization and for supporting ongoing projects with theoretical findings. Fewer manual searches of printed indexes were made prior to requesting later searches, an indication of greater confidence in the online system. More later searches made use of CHEM7071, an indication that over a third of these later searches went farther back in time. Fewer later searches had offline citations printed. This, however, was a result of changes in procedure on the part of the information specialists rather than a change in user demands.

TABLE 19

Time of Use by Industrial Users

Item	Early N=52	Late N=293	Significance (less than or = to .05)
Relation to previous searches			
New search	63.8%	67.5%	.000
Continuation	13.3	17.6	.000
Modification	22.9	5.9	.000
Type of approach			
Exhaustive	51.3	24.3	.000

TABLE 19 (continued)

Item	Early N=52	Late N=293	Significance (less than or = to .05)
Purpose of use			
Keep current, own area	65.2	28.3	.000
Supporting project--theory	19.1	9.1	.01
Sources used prior to search			
Manual searched indexes	37.4	15.2	.000
Files searched			
CHEM7071	7.0	39.6	.000

Frequency of Use by Academic Users

Light - 1-4 uses per user (N = 71)

Medium - 5-9 uses per user (N = 113)

Heavy - 10 or more uses per user (N = 169)

This analysis of the data is in some respects similar to the time of use analysis in that it compares users with different amounts of system experience. The frequency of use comparison groups users into three categories by number of searches requested. This again is not a comparison without flaws since the heavy uses include records of such users when they were early (inexperienced) users and since some of the light users might have had experience with another online-searched index. Despite these contaminating factors both later uses and heavy uses exhibited changes that are probably due to the effect of experience on the part of the heavy and/or late users.

Fewer of the searches by heavy users were received in person and more of these search requests were received by other than the final user of the search results. This parallels the findings for the late uses and can probably be explained in the same way. There is one additional point that should be

mentioned. Heavy users have more current awareness searches. In fact, such searches, when updated periodically, account to some extent for the category of heavy user. When current awareness searches are not modified, there is no need for the user being present. As with late uses, heavy uses included more time period constraints. Unlike the later uses, heavy uses had more searches with search logic supplied than did the light and medium uses. The increased use of search logic may be explained by greater familiarity with the system on the part of the heavy user.

Both later and heavy users had fewer searches marked as being primarily for research, an indication of wider use of the system for other than supporting work on research projects. As with later users, uses by heavy users had more searches for staying current in related areas, for procedures, apparatus and methodology, and for writing grant proposals. Fewer searches by heavy users were preceded by manual searches of indexes, partly an indication of greater confidence in the online searched index, and partly the influence of the current awareness searches which cannot be searched in the printed indexes. The fewer searches by heavy users being preceded with searches of the user's personal collection can be explained in the same way. However, fewer discussions with colleagues prior to online searches for searches by heavy users can be explained by either increased confidence in the system or fewer knowledgeable colleagues to talk things over with, the latter most likely in the case of graduate students. There was less negotiation time and post-search staff time for searches by heavy users just as was the case for late users and probably for the same reasons as given above.

Searches by heavy users included a larger number of new (to the user) references in more of the searches. The use records of heavy users indicated that more of the retrieved references were to be investigated than references retrieved in searches by other than heavy users.

There was no significant difference in user feedback on currency, size,

or utility of search output on the part of light, medium and heavy users. As with the data for early versus late use, data for frequency of use suggests that, with experience, users will use the system for a greater variety of information needs, make greater use of the system's options but will change their opinion of the output of the system.

TABLE 20

Frequency of Use by Academic Users

Item	Light (1-4)	Medium (5-9)	Heavy (10+)	Significance
Search request received				
In person	88.7%	100.0%	86.4%	.001
Other than final user	8.5	0.0	13.0	.001
Relation to previous searches				
New search	84.5	77.9	58.0	.001
Continuation	7.0	6.2	17.2	.001
Modification	5.6	14.2	20.1	.001
User assistance				
Logic supplied	9.9	22.1	27.8	.01
Search contraints				
Time period	0.0	8.0	18.3	.001
Primary applications				
Research	95.8	84.1	81.1	.02
Type of approach				
Current awareness	4.2	10.6	17.8	.02
Browsing	7.0	7.1	1.2	.03
Purpose of use				
Stay current, related areas	8.6	14.2	21.9	.03
Supporting project--procedures	31.0	15.0	28.4	.02
Preparing internal report	0.0	2.7	0.0	.05
Preparing publication	45.1	32.7	27.2	.03
Dissertation	22.5	23.9	16.6	
Grant	2.8	3.5	8.3	

TABLE 2C (continued)

Item	Light (1-4)	Medium (5-9)	Heavy (10+)	Significance
Sources used prior to search				
Manual search of indexes	45.1	24.8	22.5	.002
Online system aids	0.0	2.7	0.0	.05
Personal collection	46.5	37.2	28.4	.03
Discuss with colleague	38.0	21.4	17.2	.002
Negotiation time				
0-1	22.5	24.8	34.3	.005
2-3	16.9	32.7	24.3	.005
4+	50.7	33.6	26.6	.005
Citations printed online				
0-3	18.3	20.4	33.1	.02
4-10	31.0	21.2	22.5	.02
11-20	31.0	31.0	18.3	.02
21+	19.7	27.4	26.0	.02
Post-search staff time with user (minutes)				
1	31.0	33.6	17.8	.001
2+	19.7	14.2	9.5	.001
Citations--new references				
0-2	35.2	30.1	21.3	.03
3-8	26.8	22.1	24.9	.03
9-18	18.3	12.4	25.4	.03
19+	19.7	35.4	28.4	.03
Citations to investigate				
0-2	38.0	32.7	21.9	.008
3-5	21.1	20.4	23.1	.008
6-12	21.1	11.5	27.2	.008
13+	19.7	35.4	27.8	.008

Frequency of Use by Industrial Users

Light use - 1-4 times per user (N = 143)

Medium use - 5-9 times per user (N = 101)

Heavy use - 10 or more times per user (N = 101)

Somewhat more searches by heavy users were received in writing and/or in person, an indication that the experienced (heavy) user has a preference for

these approaches. A smaller number of searches by heavy users are received by phone; that is the other side of the coin. No consistent pattern exists in supplying search logic. Users in the medium groups supplied search logic more frequently than users in the other two groups. Heavier users have more continuing searches and modified searches but fewer new searches than do other users. Heavy users did not specify a maximum number of citations to be retrieved. This was only done in a small number of uses for the other users and may be a reflection of the absence of a charge for the searches.

In purpose of use, more of the heavy uses were for current awareness which, as was pointed out in the academic usage discussion, is in part what makes a user a <u>heavy</u> user. Heavy users also made the largest number of uses of the system for searches on theoretical work and preparation of internal meetings. Heavy users were neither high nor low in terms of using the system for exhaustive searches, for staying current in related areas, or for developing new specialties. Fewer heavy users searched internal company reports prior to online search requests. Heavier users made more searches of CHEMCON but fewer searches of COMPENDEX, perhaps an indication that the scientists made greater use of the system than engineers. The heavy user was likely to make more offline printing requests. Heavy users were more satisfied with the utility of search output than users in the other two groups.

TABLE 21

Frequency of Use by Industrial Users

Item	Light (1-4) N=143	Medium (5-9) N=101	Heavy (10+) N=101	Significance
Search request received				
In writing	26.6%	13.9%	27.7%	.03
In person	58.0	73.3	76.2	.005
By phone	20.3	18.8	619	.02
User assistance				
Logic supplied	13.3	26.7	11.9	.007
Relation to previous searches				
New search	81.8	62.4	55.4	
Continuation	7.7	19.8	21.8	.001
Modification	4.9	12.9	16.8	
Search constraints				
Maximum number of citations	5.6	1.0	0.0	.02
Type of approach				
Current awareness	5.6	5.9	16.8	.005
Exhaustive	25.9	40.6	36.6	.04
Stay current, related areas	15.4	5.9	7.9	.04
Purpose of use				
Learn new specialty	26.6	11.9	13.9	.006
Support project theory	12.6	4.0	20.8	.002
Support project facts	26.2	16.0	32.7	.03
Prepare for internal meeting	2.1	0.0	5.9	.03
Sources used prior to search				
Internal company report	14.7	10.9	1.0	.002
Files searched				
CHEMCON	83.2	77.2	90.1	.05
COMPENDEX	12.6	13.9	3.0	.02
Citations printed off-line				
1+	62.9	54.5	72.3	.04
User opinion of utility of results				
Very satisfactory	41.3	60.4	53.5	
Satisfactory	28.0	14.9	30.7	
Unsatisfactory	14.0	5.9	6.9	.02
Highly unsatisfactory	5.6	7.9	3.0	

Calendar Age of Academic Users

Born before 1930	N = 39 (uses)
1930 - 1939	N = 44
1940 - 1949	N - 155
1950 or later	N - 115

The 353 uses were analyzed to determine whether younger users, those 27 years or younger, used the system differently than other users. User studies suggest that younger users are less set in their information habits since they have had less time to develop and live with them. Fewer search requests by younger users were presented in writing, perhaps because more younger users brought in their requests not fully thought out and ready to put in writing. Fewer younger user requests had author constraints (except for requests by users 47 years or older). This may be explained by lesser use of the system for author searches or lack of familiarity with authors in a given subject and thus lesser use of authors as a means for reducing search output. Fewer requests by younger users were directly related to research projects with a larger number related to teaching. This may be explained by the younger users' greater need for initial course material preparation. Fewer searches by younger users were exhaustive searches and searches for staying current in one's area of interest. The latter might be due to younger users' narrower subject interests and, perhaps, ability to keep up by reading a relatively small number of primary journals. Younger users may also be doctoral students who may be helped in their current awareness efforts by their faculty advisor. There appears to be no special pattern for younger users in terms of purpose of use, i.e., for specific facts of procedures, and/or theory. In view of the number of doctoral students included in the younger users group, it is not surprising that more of their uses were for

dissertations and that fewer uses were for publications and grant proposals. Fewer requests by younger users were preceded by a search of a personal document collection (fewer younger users probably have such a collection) or discussion with colleagues (those also take time to acquire). Fewer uses by younger users were in the Smithsonian Science Information (SSIE) data base and in other than the Chemical Abstracts and Engineering Index data bases. More of the 27-37 age group users were present and interacted during the search, another indication that searches requested by these age groups are brought in a more negotiable form than searches brought in by older users.

Uses by older users (47 years or older) were ranked lower in utility by the users than searches for younger users, perhaps an indication of a more critical attitude and/or more familiarity with the literature.

TABLE 22

Cadendar Age of Academic Users

Item	Birth Date				
	Before 1930	1930-1939	1940-1949	1950+	Significance
Search request received					
In writing	76.9%	68.2%	60.6%	52.2%	.04
Search constraints					
Author	7.7	34.1	21.3	16.5	.04
Primary application					
Research	94.9	81.8	91.0	74.8	.001
Other, course related	2.6	2.3	1.3	5.2	
Other, not course related	0.0	11.4	3.2	17.4	.001
Type of approach					
Exhaustive	48.7	68.2	52.3	39.1	.009
Specific facts, procedures	12.8	0.0	18.1	13.9	.03
Purpose of use					
Stay current, own areas	51.3	59.1	60.0	40.9	.02
Support project - theory	30.8	9.1	22.6	13.0	.02
Support project - facts	28.2	38.6	44.5	27.0	.02
Support project - procedures	15.4	4.5	29.0	29.6	.003
Prepare publication	53.8	38.6	45.8	5.2	.001
Dissertation	50.0	0.0	68.3	54.8	
Grant	33.3	94.1	2.4	1.4	.001

TABLE 22 - continued

Item	Birth Date				
	Before 1930	1930-1939	1940-1949	1950+	Significance
Sources used prior to search					
Personal collection	35.9	45.5	41.3	21.7	.004
Discuss with colleague	30.8	27.3	27.1	12.2	.004
Files searched					
Other than CA and Engineering	12.8	18.2	3.9	2.6	.001
SSIE	7.7	9.1	1.9	1.7	.04
User present during search					
In person	46.2	65.9	77.1	72.6	.002
User interaction	50.0	68.2	76.6	73.7	.02
Utility of results					
Very satisfactory	56.3	72.7	66.2	46.7	
Satisfactory	21.9	18.2	20.6	39.3	
Unsatisfactory	12.5	4.5	7.4	10.3	.03
Highly unsatisfactory	9.4	4.5	5.9	3.7	

Calendar Age of Industrial Users

Born before 1930	N = 71
1930 - 1939	N = 125
1940 - 1949	N - 176
1950 or later	N - 10

The number of uses by users 27 years or younger was too low (10 uses) to be able to say much, if anything, about this group of users. Looking at the uses by the oldest group of users (47 years old or older), one might suggest the following. Olderusers who are likely to have more job responsibility that keeps them at their desks made more uses via the telephone and were present during fewer searches and interacted in fewer searches. Older users made no current awareness searches (either because they might have assistants to help with this work or because their job might not require keeping up with the published literature). Older users made less use of the system for learning a new specialty and this might be

explained by a lesser need for such a task by the more established employee. Searches by older users went farther back in time than that of other users as suggested by the heavier use of CHEM7071. Older users made less use of COMPENDEX and POLLUTION.

TABLE 23

Calendar Age of Industrial Users

Item	Birth Date: Before 1930	1930-1939	1940-1949	1950+	Significance
Search request received					
By phone	26.8%	12.8%	13.2%	10.0%	.05
Type of search					
Current awareness	0.0	9.6	13.2	10.0	.02
Intent of use					
Learn new specialty	8.5	16.8	23.5	50.0	.004
File used					
CHEM7071	46.5	28.0	20.6	0.0	.001
COMPENDEX	7.0	8.8	11.0	40.0	.02
POLLUTION	0.0	2.4	0.0	20.0	.001
User present for search					
In person	31.9	42.7	55.8	50.0	.04
By phone	4.3	0.8	1.6	0.0	
User interaction with search	30.9	38.7	58.1	40.0	.001

Professional Age of Academic Users

Highest degree received:

Before 1960 N =

1961 - 1970 N =

1971 - 1977 N =

The 353 uses were divided by professional age of the user, the number of years since the user obtained his highest degree. This was done in part to determine whether users with relatively few years of professional experience (younger users) made different use of the system than

the other, older users. The other reason for this analysis was to compare young users in terms of calendar years with young users in terms of years of professional experience.

Fewer of the searches by younger professional age were submitted in writing. This parallels the finding for the younger (calendar age) users and is probably for the reasons already given. For requests received by other than the final user of search results and search constraints by time period, uses by the younger users were between those of the other two groups of older users. Only the older users requested English-only search constraints and that only in a small number of cases. The fewest requests for current awareness searches were made by the younger users, again probably for the reasons given under calendar age. As with the younger calendar age group, the professionally younger-aged made more use of the system for dissertations and for fewer publications of papers and grant proposals. Younger scientists made little use of the system for internal meetings and no use for internal reports. This may be attributable to the younger users' lack of involvement in such activities. Younger users made highest use of the system for a few references on a topic and procedures, methodology and apparatus and the lowest use for facts. Younger users used manual searches of indexes more times than other groups, either because of lesser confidence in online searched indexes, and/or because of lesser availability of personal document collections and discussion with colleagues. Uses by younger users required more negotiation time, another indication that the searches by younger users were less ready to be run. Search connect time for younger users falls between the other two groups. Younger calendar and professional-aged users were both present and interacted more frequently than the other groups during the search. More of the searches for younger users were considered satisfactory or very satisfactory in terms of currency and utility of output.

TABLE 24

Professional Age of Academic Users

Item	Highest Degree Received: Before 1960	1961-1970	1971-1977	Significance
Search request received				
In writing	77.6%	49.3%	60.8%	.008
In person	98.0	80.8	93.1	.002
By other than final user	2.0	19.2	6.0	.001
Search constraints				
English only	4.1	0.0	0.0	.003
Time period	4.1	23.3	9.2	.001
Type of approach				
Current awareness	18.4	23.3	8.8	.004
A few references	12.2	9.6	23.0	.02
Purpose of use				
Supporting project - facts	36.7	47.9	31.3	.04
Supporting project - procedures	6.1	26.0	28.6	.005
Preparation for:				
Internal meeting	0.0	17.8	1.8	.001
Internal report	0.0	4.1	0.0	.004
Publication	38.8	46.6	26.3	.004
Dissertation	6.1	6.8	25.8	.001
Grant proposal	22.4	9.6	0.9	
Source used prior to search				
Manual search of indexes	14.3	26.0	32.3	.04
Negotiation time (min.)				
1	34.7	24.7	28.6	.04
2-3	16.3	16.4	30.9	
4+	32.7	39.7	31.3	
Terminal connect time (min.)				
1-7	18.4	21.9	23.0	.05
8-13	24.5	43.8	24.4	
14-23	28.6	15.1	26.3	
24+	28.6	19.2	26.3	
User present for search	49.0	63.0	76.0	.002
User interaction with search	49.0	64.4	76.5	.003
User opinion of results				
Currency:				
Very satisfactory	30.6	60.3	41.5	.002
Satisfactory	49.0	23.3	47.9	
Unsatisfactory	0.0	0.0	1.8	
Highly unsatisfactory	0.0	0.0	0.5	

TABLE 24 - continued

Item	Highest Degree Received			
	Before 1960	1961-1970	1971-1977	Significance
User opinion of results				
Utility:				
Very satisfactory	46.9	63.0	51.6	
Satisfactory	22.4	9.6	30.0	.01
Unsatisfactory	10.2	4.1	7.8	
Highly unsatisfactory	6.1	6.8	3.7	

Professional Age of Industrial Users

Highest degree received:

Before 1960	N = 128 uses
1961 - 1970	N = 70 uses
1971 - 1977	N = 144 uses

More searches by users in the highest professional age group requested searches by phone. This is similar to the findings by calendar age and probably for the same reason. More searches by the older group of users were for facts or procedures and more searches by the older group of users went back further in time as reflected by heavier use of CHEM7071. The oldest user group retrieved the fewest references potentially relevant and new to them. This might be attributed to a more critical relevance judgment, more specific search statement, or perhaps fewer potentially relevant citations in their searches. Older users knew of fewer potentially relevant and not retrieved documents which might either by explained by lesser familiarity with the literature or better search results. The youngest group of users planned to further investigate a larger number of the citations retrieved, probably because on the average, a larger number of citations were new and potentially relevant to this group of users.

TABLE 25

Professional Age of Industrial Users

Item	Before 1960	1961-1970	1971-1977	Significance
	Highest Degree Received			
Search request received				
By phone	22.7%	7.1%	14.6%	.02
User assistance				
Logic supplied	18.8	7.1	20.1	.05
Search constraints				
Author	4.7	14.3	4.9	.02
Type of approach				
Specific facts or procedures	50.8	37.1	30.6	.003
Files searched				
CHEM 7071	39.1	28.6	19.4	.002
Citations				
New references				
0-2	33.6	34.3	19.4	.001
3-8	28.9	24.3	14.6	
9-18	15.6	17.1	21.5	
19+	21.9	24.3	44.4	
Not retrieved				
0	53.1	37.1	37.5	.02
1+	46.9	62.9	62.5	
Investigate further				
0-2	36.7	42.9	26.4	.02
3-5	24.2	20.0	13.9	
6-12	14.8	14.3	20.1	
13+	24.2	22.9	39.6	

Positions of Academic Users

Faculty	N = 108
Postdoctoral Fellows or research associates	N = 77
Graduate Students	N = 168

The graduate student (doctoral candidate) uses should be similar to uses by younger (calendar and professional age) users, and in several respects this is true. Fewer of the graduate students' uses were submitted in writing. More of the graduate students than faculty (but not post-docs) were present during searches and more graduate students interacted during searches. Also, searches by graduate students required more negotiation time. Fewer graduate students searched personal document collections or had discussions with their colleagues prior to requesting online searches. More graduate students than faculty but not post-docs searched printed indexes prior to requesting online searches.

Faculty are older in terms of both calendar and professional age and have a broader range of responsibilities than either post-docs or graduate students. This is reflected in higher faculty use of the system for teaching, preparation for internal meetings, and preparing grant proposals, as well as higher use of the system for current awareness. The latter may explain the higher number of searches by the faculty with time constraints. More of the faculty searches had synonyms supplied, and more of the faculty uses were for specific facts.

Post-docs and research associates are professionally older than graduate students but younger than faculty. Post-docs and research associates also typically represent an intermediate group in terms of job responsibility. This is reflected in some but not all of the findings, for instance, in use of the system for teaching, and grant proposals and preparation for

internal meetings. However, post-docs made the largest number of system uses for publication. More post-doc uses were preceded by manual searches of indexes, possibly an indication of lower confidence in the online searched system. Post-doc users also had more discussions with colleagues, and about the same number of searches of personal collections as the faculty prior to the use of the system. The lowest use by post-docs of the system for current awareness might be an indication of this group being ahead of the literature in their specialty.

TABLE 26

Positions of Academic Users

Item	Faculty	Post-doc/RA	Doct. Candid.	Significance
Search request received				
In writing	63.9%	74.0%	52.4%	.004
User assistance				
Synonyms supplied	[illegible]5.6	41.6	36.5	.02
Search constraints				
Time period	16.7	0.0	13.1	.002
Primary application				
Teaching	5.6	1.3	0.0	.02
Research	87.0	93.5	79.8	.02
Type of approach				
Current awareness	19.4	1.3	13.7	.002
Purpose of use				
Supporting project-facts	45.4	27.3	34.5	.04
Preparation for				
Internal meeting	9.3	3.9	2.4	.04
Publication	45.4	62.3	10.7	.001
Dissertation	2.8	2.6	39.3	.001
Grant proposal	16.7	1.3	0.6	
Sources used prior to search				
Manual search of indexes	13.0	35.1	33.9	.001
Personal collection	44.4	44.2	24.4	.001
Discuss with colleague	26.2	33.8	15.5	.004
Files searched				
CHEMCON	90.7	93.5	97.6	.05
Negotiation time (mins.)				
0	19.4	7.8	8.9	.01
1	29.6	32.5	26.8	
2-3	13.9	28.6	31.5	
4+	37.0	31.2	32.7	
User present for search	52.8	79.2	76.8	.001
User interactions with search	55.6	77.9	78.0	.001

Positions of Industrial Users

Supervisors	N = 60 users
Non-supervisory	N = 285 users

When a supervisor used the system he was more likely to request searches by phone than non-supervisors. He was not likely to use it for current awareness and less for information on procedures, apparatus, or methodology. More frequent use of CHEM7071, the older Chemical Abstracts data base, was made by supervisors. This, perhaps, was because more searches for the remembered literature were made. If we can assume that supervisors are older both in terms of calendar and professional age than non-supervisors, then there is consistency in the greater use of the telephone and higher use by these groups of the older literature as represented by CHEM7071.

TABLE 27

Positions of Industrial Users

Item	Supervisory	Non-supervisory	Significance
Search request received			
By phone	31.7	12.6	.001
Type of approach			
Current awareness	0.0	10.9	.02
Purpose of use			
Supporting project-procedure	38.3	56.1	.02
Files searched			
CHEM7071	46.7	24.9	.002

PHASE I — USER INTERVIEWS

Following the first phase of the project at FSU and MTC, interviews were conducted with selected users. These interviews were designed to probe specific aspects of user reactions to online searching and to seek evaluative comments and information that might not appear on the survey questionnaires. These interviews were conducted during October and November 19[illegible] and a list of the questions asked is included in the appendix.

Methodology

The methodology of the interviews was to select potential interviewees from the several categories of users: frequent users, early use-dropout and non-use. In the case of Monsanto, some members of the original test sample later began to do searching on their own, so that these self-searchers were a small sub-group that was of interest and several of these persons were also interviewed. Because of the physical distance to the various Monsanto facilities, all interviews with Monsanto users were by telephone. Most of the interviews with FSU users were also by telephone although it proved convenient to do three interviews in person.

FSU interviewees were selected by first grouping the fifty available sample members by extent of use. Potential interviewees from each category were selected to represent the three types of users by status, that is, faculty member, post-doctoral/research associate, and graduate student. A minimum of three persons per category was chosen, with the total approximating twenty percent of the full sample.

For Monsanto, all 109 sample users' search records were reviewed for the number of searches performed, the date of first search and date of last

search. A histogram of number of searches was made to determine a cut-off level for frequent users. This was determined to be eight searches, i.e., approximately ten percent of all Monsanto users had eight or more searches. Participant identification numbers were arranged sequentially within use categories. Since the desired number of interviewees in each category was five, the total number of users per category was divided by five to determine the n-th number to be selected. That is, the number of early users was 29; divided by five gave 6 (rounded); every sixth user number, starting with the sixth, was selected for interviewing.

In addition, for frequent use, the two most frequent users were also included, no matter what their identification number. For the non-users, a further distinction was made before selection between persons who might reasonably not have been expected to use the service by virtue of their work (administrators, equipment technicians) and those who might have been expected to use the service but did not do so (chemists, researchers).

Sample

At FSU, thirteen persons were selected as potential interviewees and ten were actually interviewed (about 20 percent of the participants). The others were not available for various reasons. At Monsanto, twenty-two persons (not counting self-searchers) were selected, and 16 were actually interviewed (plus two self-searchers.) Care was taken to insure that all user categories were represented by the completed interviews so that the type of person not contacted did not bias the result.

Because of the evaluative and subjective nature of the responses, the results of the interviews were not coded for computer analysis. However, some manual analysis of the interviews was done under several categories.

Most Helpful Results

When asked what had been the most helpful results of online searching,

a majority of the respondents at both FSU and Monsanto said that keeping current in the literature of a field, rapidity of access, and time saved were primary benefits. One industrial user said he did not concern himself with keeping current in certain topics because he knew he could always get updated quickly from the online search service. This same user also commented that when he got a new project, his "first stop" was to do online searching. As one bench chemist put it, "manual searching can't even compare with online searching." One FSU graduate student, a frequent user, said that the rapid access and fast interaction were helpful in checking out even half-formed ideas. He described the system as like having a "smart pal" who could respond on any topic asked.

When asked about the effect of online searching on their other work activities and on their productivity, most of the users referred to being able to work on other tasks because of the time saved by online searches. Of those at FSU who commented on the effect on their productivity, one faculty member said that his productivity in writing had increased ten to twenty percent as a result of doing online searches. Another person felt his productivity had increased but could not be more specific, while a third user felt that there had been no effect on his productivity. At Monsanto, one bench chemist estimated his productivity had increased twenty percent due to online searching, while others felt that online searches had helped or increased their productivity though to an unspecified degree.

One FSU professor said that there was "no doubt about it," that online searching let him make better use of his time. In one instance he was able to complete the preliminary literature search within several weeks after moving into a new subject area and was able to have a research proposal written shortly thereafter. A research specialist at Monsanto said that

when getting into a new research area, "a couple of hours of online searching would save a couple of weeks library work." Another industrial chemist related that he had to quickly research a serious industrial hygiene problem that could have required Federal government intervention. Because of the rapid response and scope of the online search, the government office told Monsanto to handle the problem because the company appeared to know more about the matter than did the government agency. Still another Monsanto user recalled a case where online searches brought him to a point where he was conversant on a topic much more rapidly than if he had had to depend upon manual searching: "With online it took a month or so; a manual search might have taken six months to a year."

System Improvements

Users were asked about improvements they felt could have helped their own searches or the basic search process. At FSU, the comments were varied and included such things as giving written information to users to help them work out search strategies in advance, being able to search by compound registry number of chemical formula, having more retrospective files, and getting help selecting the right keywords (search terms). Comments from Monsanto users were focused on having more retrospective data in the files and on finding it difficult to select suitable keywords. Perhaps the most frequently mentioned problem area from both groups was the inability to select keywords to produce a precise search.

Expectations

When asked about their expectations regarding online searching, most users at both Monsanto and FSU seemed to have had no preconceptions and generally felt that there were no "surprises" to the system. A few found the system easier to use or more effective than expected. At FSU only one respondent (a frequent user) had expected the system to be easier to use

than it proved to be. (Her expectations may have been somewhat unrealistic in that she expected to walk in and "push a button" to get her answers.) At Monsanto one person (a frequent user) was "somewhat disappointed" in the system, primarily from not getting enough relevant citations during precise searches. But most of the industrial respondents reported no surprises or found that it worked much better than expected.

Most useful periods

One aspect of literature searching generally, and of online searching in particular, is when, during the course of a project, it is most likely to be done. It would be logical to assume that literature searching is needed and useful at the beginning of an activity, as the researcher is seeking to learn about the topic. A clear majority of users at both FSU and Monsanto stated that this was the case - online searching is very useful in the early phase of work. Some others also commented that they used online searches toward the end of work when writing up results and double-checking to insure that no pertinent references had been overlooked. A few respondents noted that they used online searching at different times throughout the life of a project for updating and for searching for specific materials. One FSU graduate student said he liked to explore sudden interests via online "to keep ideas rolling."

Proxy searching

It was recognized that the immediate user of an online search may not be the only beneficiary of the results; other users and some non-users may benefit at second hand. At FSU and Monsanto about half of the interviewees said they had shared their searches with others or had used searches done by others. The remainder either had not shared their searches or had not used searches done for others or could not recall. This simply illustrates that

the value of an online search system extends beyond the circle of immediate users. One FSU user reported that he did a search which was shared by all the other persons in his laboratory. A faculty member commented that he had sent copies of his search results to a collaborator at a university in a Western state.

End user-dropout

A fairly distinct group of users, according to search records, were those who used the service in the early months of its availability and then stopped using it. In a few cases, this early use was relatively frequent. For those who used the service and then stopped, the primary reasons mentioned were: the person had found what he was looking for and had no further need for literature searching; he had been disappointed and not found what he wanted and therefore concluded the system could not help him; or, mainly for Monsanto users, he had moved into a different type of work which did not require literature searching.

Non-users

Not everyone in the academic and industrial user samples made use of the online search service. Individuals simply felt no need to do extensive literature searching at the time the service was available. Inertia and the pressure of work were the main reasons for non-use by others. A few were skeptical of the value of online searching and seemed content with their existing information styles and search habits.

At FSU the four non-users interviewed reported variously that they were doing other work and had no time for literature searching, had no need for literature searching, or depended upon their own manual search methods and filing systems. Monsanto non-users most often spoke of being transferred to other types of work not requiring literature searches, or depending upon co-workers to do the needed searching.

These comments (at least by the academic participants) are paralleled in a survey of academic non-users of a computer retrieval system at the University of Texas. When asked why they did not use the system they reported a variety of reasons: no need for it; did not know about it; relied on a small core of journals. However, in the view of the authors, "the postulated reason [for non-use] - 'ingrained research habits' - can still be considered as a key reason." (J.K. Martin and R.G. Parsons, "Evaluation of Current Awareness Service for Physics and Astronomy Literature," Journal of the American Society for Information Science 25:156-161 (1974)).

Self searching

After the interviewing had been underway for some time, it was felt that it would be revealing to obtain comments on the value of being able to do self-searching at the terminal. This relates to the question of the role of the intermediary in the search process. While not all interviewees were asked this question, enough responded to provide some comments of interest.

Two of six FSU user respondents volunteered their interest in self searching. At Monsanto about half of the users said they would like or prefer to do self searching, while the other half said they would prefer not to. Of those who preferred to have an information specialist do the the actual searching, the reasons most often mentioned were that it would otherwise take too much of the researcher's time, and the specialist could do the search more efficiently because he worked with the system all the time, whereas an infrequent user would not use it enough to be able to do efficient searches.

Of those interested in doing their own searching, reasons mentioned included the belief that it was difficult to explain search terms to another person (the intermediary), or that the researcher would probably spend more

time searching a topic than would the intermediary.

Paul Gann, manager of the Monsanto technical library at Pensacola, commented on self-searching at Monsanto. It was initiated by a department director who believed that effective research and development is greatly enhanced by good use of the technical literature. Gann said that some chemists were comfortable at the terminal and easily comprehended interacting with the computer, while others would "freeze." The training of these self searchers was limited to one or two data bases for any one user, and, noted Gann, "differences in search procedures and data base formats become major obstacles to these people." (P.W. Gann, "On-Line Searching at Monsanto Textiles Company," paper presented at Technical Information Users Council meeting, Raleigh, NC, April 28, 1977.)

Mr. Gann said that he trained approximately a dozen chemists and chemical engineers to do their own bibliographic searching. Of that number, about six had actively used the system on their own and three of those were fairly frequent. However, self-searchings were done a couple of times a month at most.

The self-searching resulted from a meeting of Gann and the heads of chemical research at Monsanto, in which Gann described the system and his belief that self-searching would not be too difficult and that the library would train anyone who was interested. The directors then encouraged their chemists to take the training.

The first group of self-searchers was trained in May 1976 and several other groups were trained later. Training consisted of lectures and "hands-on" experience in small groups of two or three persons. Some of the chemists began searching right away; others were very interested but did not follow through. Gann periodically sent out followup memos to remind and encourage

those he had trained, and held followup training for both new and experienced users.

All of the searchers were from the chemical research and development laboratories of the Monsanto plant. These people were located in their own building and had their own terminal (a Texas Instruments 745) and microfiche index files of Chemical Abstracts and Engineering Index. Chemical Abstracts on microfilm was located adjacent to the online terminal.

Of three self searchers who made the most use of the system, two were interviewed. One said that he actually preferred to have an information specialist do searching when possible. This user estimated that he himself did about twenty-five percent of his searches, mainly because he thought he could do it faster and he enjoyed the interactive process. He found that the system was "very simple to use" once you learn it. He did say that for self-searching, one must do it frequently to become adept, and he thought the inherent complexities of the system meant that it would always be preferable to have an information specialist around.

Another searcher made the point that he liked to do his own searches if he could do them often enough but that infrequent searching meant that he forgot how to use the system effectively. He thought it would be helpful to have available a brief summary of the mechanics of searching as a way of refreshing his memory. For occasional searching, he preferred to let a specialist do it.

In both of these cases, self-searching was done no more often than once every three to four weeks. The experience of academic self-searchers during Phase III of this project is given elsewhere in this report.

PHASE II: HALF COST, MEDIATED SEARCHING

Phase II of this project was conducted only at FSU and lasted from mid-October 1977 to late May 1978. This phase concentrated on the effect of user fees on interactive searching. About one-half of the cost of the searches was charged indirectly to the users. During this phase the potential user population was extended beyond the original sample to encompass all faculty and graduate students of the Chemistry Department - about 140 in number. Embedded within this phase was a 33-day period of non-mediated, no-cost searching, described later.

Indirect User Charges

An agreement with the FSU Chemistry Department permitted departmental funds to be used to pay for one-half of the computer connect time and for the offline citations printed. Users could make charges to various project grants within the department or, in certain cases, to departmental general funds. Direct payment by users was not accepted. When they came for searches, users were told of the arrangement, asked how the searches should be charged, and the resulting records were provided to the departmental business office for charging to appropriate accounts. The actual searches were still negotiated and performed by the information specialists.

Sample

The potential user population, as already mentioned, consisted of all Chemistry Department faculty, post-doctoral and research associates, and graduate students. This potential user population included 33 faculty members, 24 post-doctoral and research associates, and 84 graduate students. Of that number, 55, or 39 percent, used the service during phase II.

It is interesting to contrast those phase II users who had also used the service during phase I, with those users who were now attracted to the service for the first time. The phase I users include those who were participants in the study sample and those non-sample users who received service when it did not conflict with searches for sample users. These non-sample phase I users must be recognized because their exposure to the service may have influenced their use or non-use of it during phase II.

Phase II Search Service Unique Users

	Original Sample	Non-sample Prior Users	New Users	Total Unique Users
Faculty	12	1	3	16
Research Assoc/ Post-Doctoral	2	2	6	10
Graduates	7	12	10	29
Other	---	1	1	2
Totals	21	16	20	57

Of the total unique users during phase II, 37 percent were from the original phase I sample while 28 percent were non-sample people with phase I search experience. Thus, almost two-thirds of the unique users during phase II had prior experience with the service.

Test Instruments

To gather research data for phase II, the information specialist's Record of Online Use was modified by the addition of a question which asked how the requested search was to be charged. Four response options were given: user's own grant, major professor's grant, departmental funds, and other.

Since the potential user population had been expanded, demographic data had to be collected on first-time users of the service. This was done by

interview during the initial visit and this data, along with a record of all searches, was maintained for each user.

Procedure

The manner in which search service was provided remained essentially unchanged from phase I. The location of the terminal and the hours of operation remained the same. A different type of terminal was installed but with the same speed as the prior unit. Announcement memos were sent to all potential users and a special presentation was given at a department seminar early in phase II to explain the service and answer questions about it. Information on individual searches and on user reactions was gathered in the same manner as in phase I.

Comparison of Half-Cost and Free Mediated Searches by Academic Users

Half-cost mediated searches N = 155

Free mediated searches N = 353

For each of the 155 half-cost uses, records were kept of use and of user feedback. Comparing these data with those of free mediated searches, fewer half-cost use requests were submitted in person and fewer were submitted in writing, while more half-cost search requests were submitted by other than the final user of the information.

It seems that the person in a position to pay for the searches is less likely to have time either to come to the search office or to submit his question in writing. More half-cost users either did not negotiate or took more time (4 or more minutes) to negotiate. There were fewer modifications but more continuations of half-cost searches, possibly because of the greater experience of the half-cost users. More half-cost users supplied synonyms and search logic, probably because of greater interest in search efficiency.

Fewer half-cost searches had author constraints, more date constraints. Again the cost factor may have been responsible for the difference. Author searches which are done efficiently in printed indexes were probably done with such indexes instead of paying for them in online searched systems. Data constraints as a method of reducing size of output and therefore cost were used more extensively.

More half-cost current awareness searches were made. Also, more half-cost searches were made to learn a new specialty, to support ongoing projects with theory, facts, procedures, apparatus or methodology, and to prepare internal reports. Half-cost searches required less computer connect time (a charge assessed to the user), but more post-search staff time. More half-cost users indicated that not enough citations were retrieved but more

half-cost users were satisfied or very satisfied with the currency and utility of the search output, an internal inconsistency.

Perhaps equally interesting is the absence of significant difference between half-cost users and free users for the other aspects of the search, such as purpose of use of system and information sources used prior to requesting online search.

TABLE 28

Comparison of Half-Cost and Free Mediated Searches

by Academic Users

Item	Free Mediated	Half-Cost Mediated	Significance .05
Search request received			
In writing	60.6%	41.7%	.0001
In person	91.2	80.1	.0007
By phone	0.0	0.6	
By other than final user	7.9	14.1	.05
Relation to prior searches			
New search	69.7	70.5	
Continuation	11.6	19.2	.002
Modification	15.3	5.1	
User assistance			
Synonyms supplied	43.3	57.7	.02
Logic supplied	22.4	31.4	.04
Search constraints			
English only	0.8	1.3	
Author	19.8	9.6	.01
Publication type	0.0	0.0	
Maximum number	1.7	.6	
Time period	11.3	20.5	.009
Primary application			
Teaching	2.0	2.6	
Research	85.0	85.3	
Other, course related	2.8	2.6	
Other, not course related	8.5	3.8	
Type of search			
Current awareness	12.7	26.9	.0002
Exhaustive	49.6	42.9	
A few references, browsing	22.1	14.7	
Specific facts, procedures	13.9	14.7	

TABLE 28 - continued

Item	Free Mediated	Half-Cost Mediated	Significance .05
Purpose of use			
Stay current, own areas	52.7	58.3	
Stay current, related areas	16.7	18.6	
Brushing up	8.8	12.2	
Learn new specialty	19.8	36.5	.0001
Support project-theory	18.7	43.6	
Support project-facts	36.3	59.0	
Support project-procedures	24.6	44.9	
Preparation for			
Internal meeting	4.8	7.1	
Internal report	0.8	4.5	
Publication	32.6	37.2	
Dissertation	20.1	19.2	
Grant proposal	5.7	5.1	
Testing system	0.3	0.0	
Other	12.7	5.8	
Sources used prior to search			
Manual search of indexes	27.8	36.5	
Online system aids	0.8	0.6	
Personal collection	34.8	42.9	
Discuss with colleague	22.7	27.6	
Negotiation time (min.)			
0	11.9	25.0	
1-2	28.9	8.3	
2-3	25.5	26.3	
4+	33.7	40.4	
Files used			
CHEMCON	94.6	98.1	
CHEM7071	24.9	17.9	
COMPENDEX	0.3	0.6	
Others	6.2	11.5	
Citations printed offline	36.3	26.9	.05
Terminal connect time (min.)			
1-7	22.1	39.1	.0002
8-13	28.3	28.2	
14-23	24.6	17.9	
24+	24.9	14.1	

TABLE 28 - continued

	Free Mediated	Half-Cost Mediated	Significance .05
Post-search staff time with user (min.)			
1-2	25.5	10.9	.0009
2+	13.0	17.3	
User opinion of citations			
Number retrieved			
About right	68.3	68.6	.007
Too many	7.1	7.7	
Not enough	13.0	19.9	
Currency			
Very satisfactory	43.9	44.9	.003
Satisfactory	43.1	46.8	
Unsatisfactory	1.1	1.9	
Highly Unsatisfactory	0.8	1.3	
Utility			
Very satisfactory	53.8	53.2	.001
Satisfactory	24.1	33.3	
Unsatisfactory	7.6	5.8	
Highly Unsatisfactory	4.8	7.1	

PHASE III: FREE NON-MEDIATED SEARCHING

For a 33-day period within phase II (February 1 through the end of the academic quarter on March 17, 1978), FSU users were offered the option of doing their own interactive searching at no charge. Users desiring to do this self-searching were given an orientation to the system and shown the basics of searching. All other features of the service remained the same, and users could still request mediated half-cost searches if they wished.

During this period two aspects of online searching were in contrast: the no-cost aspect would presumably attract users, while the need to learn about the system and to become directly involved with the terminal might be a deterrent. What would be the response?

Response

It would be accurate to say that the response was very positive. In the prior three and a half months of service, 44 unique users had requested 119 searches. In only a month and a half of self-searching, 44 unique users took advantage of this option and performed 87 searches. Of these 44 users, 24 of them were new to the search service. In other words, more than half of the users were apparently attracted to do online searching by the combination of free use and direct involvement. Only three persons requested mediated searches during this period.

User Population

Of the 44 persons who elected to do their own online searching, 32 (71%) were graduate students. Seven research associates, two faculty members, and three other persons also did their own searching. Compared to the half-cost mediated phase, more graduate students and fewer faculty members chose to

do their own searching. While two faculty members did self-searching, three other faculty members during that same period requested mediated searches.

Comparison of Free Non-Mediated with Free Mediated Use

In this section, a profile of the 87 non-mediated uses in the academic environment is given. For each of the 87 uses, a record of use and a feedback form, the same records as for the mediated (conducted by information specialists) searches, were filled out. The records for the 87 non-mediated searches were then compared with 353 mediated searches conducted in the academic environment.

Less than a fifth of the searches were submitted in written form, a significantly smaller proportion than that submitted for searches to be done by the information specialists (the mediated searches). This may be because such searches are less well thought out than mediated searches. All but a small number of searches were made by the final user of the search results. Three-fourths of the searches were new searches; the remainder were equally divided between search modifications and continuation of previous searches.

The user supplied synonyms for over a third of the searches. Search logic was supplied for over a third of the searches, a higher number than for mediated searches. The searches for which users did not supply search logic were either single concept searches or searches for which the information specialist, present during each search, supplied the search logic.

Only about one out of 20 searches had an "English language references only" constraint. This was higher than for mediated searches. About one out of five searches had author constraints with the author being either the only access point or an additional access point. About one out of 20

searches had a time period constraint. Other specified constraints were by Chemical Abstracts sections or for review articles.

The primary application of search results was for research in about nine out of ten uses. The remaining uses were either directly or indirectly related to teaching or course work. More course-related use was recorded for non-mediated than mediated uses perhaps because this type of use is better done on a self-search basis. The instructor may not know exactly what he is looking for, and may thus prefer to interact with the search output. The purpose of about a fourth of the searches was for current awareness. This is more than twice the number of uses recorded for mediated searches. About half of the searches used the exhaustive approach, about one fifth used the "few references on a topic" or browsing approach, with the remainder of the uses being for specific facts or procedures. About two-thirds of the uses were to stay current in users' areas of interest while about a fourth of the searches were to stay current with related areas. Compared to the corresponding records of mediated searches, more non-mediated searches were for brushing up (about one-fifth), for learning about a new specialty (close to one-half), to look for theoretical work (about one-third), for facts (about half), and for procedures, apparatus, or methods (about a third). More than one application of search results was checked in a number of instances.

The more extensive use of the system for the purposes listed in the non-mediated uses may be accounted for by the experience the self-user had as the recipient of mediated searches. It may also be due to different needs within the user's research project time frame. About one out of 15 uses was for preparation for internal meetings, about one out of 20 for preparation of internal reports (a larger number than for mediated searches) and about one out of five for the preparation of a paper or a publication

(lower than for mediated searches). Fewer non-mediated than mediated uses were for work on dissertations (one out of ten) and for work on grant proposals (only one such use). One use was made for preparing a technical report. The difference between non-mediated and mediated uses may be due to a lesser need for that type of use during the period of non-mediated searches and to a different mix of faculty/student users during the two phases. There were more students than faculty in Phase III than in Phase I.

Manually searched indexes were used prior to online searches in almost half of the non-mediated searches. This is a larger number of uses of printed indexes than preceded mediated searches. Almost half of the non-mediated searches were also preceded by searches in personal collections of documents and by discussions with colleagues, a higher use of these information resources than for mediated searches. These differences may be explained by the lower confidence of the user in his ability to retrieve potentially relevant documents.

Online system searching aids, such as lists of keywords, were used for about one out of five searches by the final user of the information, again a higher number of uses than for mediated searches. Non-mediated searches, with one exception, made similar frequency of use of different data bases. CHEMCON was used in more than nine out of ten searches, followed by CHEM7071 which was used in about one out of four searches. The next data base in terms of frequency of use was BIOSIS, used in about one out of six searches. The BIOSIS data base was probably used less for mediated searches because it was not available online at the beginning of the study.

While the number of citations printed online and the number of times offline printing was used did not differ significantly for non-mediated and mediated searches, there was significant difference in both number of

search statements and connect time per search. More search statements and connect time per search were used for non-mediated than mediated searches. This may be explained by greater complexity of self-searches. A more likely explanation is the lesser skill of the self-user as compared to the information specialist. Significantly less post-search staff time was required for non-mediated searches. Whether or not this saving in personnel time is offset by the increased computer connect time is hard to say, even assuming that all other things are equal - which they are not.

About one out of six non-mediated searches had technical problems. This is not significantly different from mediated searches conducted earlier. (The non-mediated searches were done in 1978 while the mediated searches were done in 1976-77.) During the non-mediated phase the system had been in operation longer than during the mediated phase, so that some of the "bugs" might have been eliminated. Fewer non-mediated searches had log-on and TYMSHARE problems, the latter being explained by more frequent use of direct dialing to SDC in lieu of using TYMSHARE.

Non-mediated searches retrieved a larger number of citations than mediated searches but were not different in terms of number of new or previously familiar citations, known relevant and not retrieved citations, and citations to be investigated further.

Self-searchers were about equally satisfied with currency of search output as recipients of mediated searches (about 86% searches were satisfactory or very satisfactory). There was no statistically significant difference in perceived utility of search results between the two groups (about 78% of mediated searches were considered satisfactory or very satisfactory and about 9 out of 10 non-mediated searches fell in these two categories). Significantly more mediated than non-mediated searches (about

68% versus 56%) had the "right amount" of output as indicated by the users of the search results. This may be a reflection of greater skill of the information specialists in coming up with the desired search results.

Inexperienced Self-searchers

It should be pointed out that the records of self-searching covered a shorter time period than the records of information specialists' conducted searches. Differences may thus be a reflection of both the inexperience of the self-searchers and the shorter time span observed. Nevertheless, we have not collected convincing evidence that the final user of the information cannot do his own online searching if he so desires. Whether or not this is the most efficient mode of operation is another matter, and one that can be argued [illegible] ways.

TABLE 29

Free, Mediated and Free, Non-Mediated Searches

in the Academic Environment

Item	% of Searches Mediated (significant data only) N=353	% of Searches Non-Mediated (significant data only) N=87	Significance .05
Search request received			
In writing	60.6	17.2	
By non-final user	7.9	6.9	
Relation to previous searches			
New search	69.7	74.7	
Continuation	11.6	11.5	
Modification	15.3	11.5	
User assistance			
Synonyms	43.3	41.4	
Logic supplied	22.4	40.2	
Constraints			
English only	0.8	4.6	.002
Author	19.8	19.5	.05
Time period	11.3	4.6	
Other restrictions			
CA section		1.1	
Rev. art.		2.3	
All other		1.1	
Primary application			
Research		83.1	
Other applications			
Not course related	8.5	4.6	.001
Course related	2.8	12.6	
Type of search			
Current awareness	12.7	28.7	.001
Exhaustive	49.6	50.6	
Few references on topic or browsing	22.1	21.8	
Specific facts or proc.	13.9	12.6	

TABLE 29 - continued

Item	% of Searches Mediated	% of Searches Non-Mediated	Significance .05
Purpose of search			
Stay current in own areas	52.7	62.1	
Stay current in related areas	16.7	24.1	
Brushing up	8.8	19.5	.008
Learning new specialty	19.8	43.7	.001
Theory	18.7	36.8	.001
Facts	36.3	56.3	.001
Procedures, apparatus, methods	24.6	41.4	.003
Preparation for			
Internal meeting	4.8	6.9	
Internal report	0.8	5.7	.009
Publication or paper	32.6	20.7	.05
Other approaches/purposes			
Dissertation	20.1	10.3	
Grants	5.7	1.1	.002
Testing system	0.3	0.0	
Other	12.7	11.5	
Sources used prior to search			
Manual search of indexes	27.8	42.5	.02
Online system aids	0.8	18.4	.001
Personal collection	34.8	47.1	.05
Discuss with colleague	22.7	43.7	.001
Files used			
CHEMCON		95.4	
CHEM7071		23.0	
SSIE		1.1	
All others			
AGRICOLA	0.3	0.0	
BIOSIS	1.1	16.1	.001
GRANTS	0.8	0.0	
CDI	0.3	1.1	
More than one	0.0	4.6	
Search statements			
No. of search statements			
1-3	28.0	14.9	
4-7	26.6	28.7	.02
8-12	24.4	24.1	
13+	21.0	31.0	
Citations printed online			
0-3	26.1	14.9	
4-10	23.8	28.7	
11-20	24.9	26.4	
21+	25.2	29.9	

TABLE 29 - continued

Item	% of Searches			
	Mediated	Non-Mediated	Significance	.05
Citations printed off-line				
0		58.6		
1+		41.4		
Terminal connect time (min.)				
1-7	22.1	11.5		
8-13	28.3	19.5		
14-23	24.6	24.1		
24+	24.9	44.8		
Post-Terminal staff time (min.)				
1-2	25.5			
2+	13.0	2.3	.001	
Problems				
Technical problems		16.1		
Log-on	10.8	2.3		
TYMSHARE	9.6	0.0		
Citations				
Number retrieved				
0-8	24.4	18.4		
9-23	25.5	25.3		
24-65	31.4	23.0		
66+	18.7	33.3		
Familiar prior to search				
1-2	19.5	18.4		
3-6	19.5	17.2		
7+	30.3	31.0		
New references				
0-2	26.9	27.6		
3-8	24.4	23.0		
9-18	19.8	17.2		
19+	28.9	32.2		
Not retrieved				
1+	41.9	48.3		
Investigate further				
0-2	28.6	32.2		
3-5	21.8	25.3		
6-12	21.0	10.3		
13+	28.6	32.2		
User opinion				
Number citations retrieved				
Just right	68.3	56.3		
Too many	7.1	8.0		
Not enough	13.0	31.0		

TABLE 29 - continued

Item	% of Searches Mediated	% of Searches Non-Mediated	Significance .05
User opinion (cont.)			
Currency			
Very satisfactory	43.9	33.3	
Satisfactory	43.1	52.9	
Unsatisfactory	1.1	5.7	
Highly unsatisfactory	0.3	0.0	
Utility			
Very satisfactory	53.8	54.[illegible]	
Satisfactory	24.1	33.3	
Unsatisfactory	7.6	10.3	
Highly unsatisfactory	4.8	1.1	

EFFECTS ON INFORMATION STYLE

In the preceding sections of this report, we have reported detailed analyses of the characteristics of users and nonusers (and early and late users, and high and low frequency users), and of the characteristics and applications of searches, for an online bibliographic search system introduced in both an industrial and an academic environment. These analyses build upon a parallel, relatively substantial body of literature and in many respects confirm earlier results based on other samples from other work settings.

The objectives of study and the mode of analyses reported in this section, on the other hand, are substantially new analytical results not generally heretofore reported in the literature. That is, this section focuses on the impact of use of online bibliographic searching on changing the "information style" of scientists and technicians in both an industrial and an academic setting. Such study requires a longitudinal analysis, with test-retest assessment, and with quasi-experimental design (i.e., experimental "treatment" and control groups). Hence, as regards research design, this study largely parallels the analysis reported a decade and a half ago by Resnick and Hensley[1] on the effects of a manual Selective Dissemination of Information (SDI) system for researchers in a business research center, as well as the study with a traditional experimental design now underway by

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[1] A. Resnick and C. B. Hensley, "The Use of Diary and Interview Techniques in Evaluating a System for Disseminating Technical Information," American Documentation, 14 (1963), pp. 109-116.

Gerstenfeld and Berger.[2] The present study, however, entails a significantly larger sample, a longer time period prior to reassessment (approximately one year), a more comprehensive set of variables for test and retest, a less structured experimental design entailing a self-selected "control" group, and, of course, a different "treatment," viz., the introduction of the rapidly spreading utilization of online bibliographic searching services.[3]

In this section, our general working hypothesis is that the exposure to and use of online bibliographic searching, with the assistance of information specialists, will significantly alter selected aspects of scientists' activities pertaining to their information style and information habits. However, inasmuch as there is not a substantial amount of prior empirical research on this topic--nor much significant theory beyond conjecture, anecdotal accounts, and P. R. by vendors of online bibliographic systems and bibliographic data bases--we did not propose directional hypotheses. That is, the research is conceived as largely exploratory, with changes assessed for a large number on measures of information style, some of which were adapted from earlier studies and some of which were newly developed for the current study.

Study Design

The study sample includes scientists and technologists in two distinctly different work settings (industrial and academic),

[2] A. Gerstenfeld, and P. D. Berger, "An Experimental Design for Improving the Transfer of Information to Scientists and Engineers," paper presented at the American Institute for Decision Sciences, San Diego, March, 1978.

[3] J. J. Gardner, and D. M. Wax, "Online Bibliographic Services," Library Journal, 101 (1976), pp. 1827-1832.

as previously described in an earlier section of this report. As also noted elsewhere,[4] 262 industrial scientists and technologists, and 70 academic chemists, completed both the study pretest and post-test survey instruments. They compose the sample for the present analyses based on a comparison of pretest and post-test responses to selected items identically repeated on both survey instruments. Of the 262 industrial sample members, 108 (41 percent) conducted online bibliographic searches during the first 13 months of the study, with an average of 3.19 searches per searcher (a total of 345 searches for the 108). Of the 70 academic chemists, 50 (71 percent) conducted online bibliographic searches during approximately the first year after introduction of the system, with an average of 7.06 searches per searcher (a total of 353 searches for the 50).

Measures of Information Style

A large array of items, identically worded for both pre- and post-test, were included in the survey instruments completed at two time periods by the 262 industrial and 70 academic scientists and technologists. In major degree, these measures of "information style" parallel and expand upon the description of information style provided by Rubenstein and associates.[5] These criterion variables include measures of (a) change in average time spent in information dissemination and gathering activities; (b) change in frequency of use of traditional information sources; (c)

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[4]A. E. Bayer and G. Jahoda, "Background Characteristics of Industrial and Academic Users and Nonusers of Online Bibliographic Search Services," OnLine Review, 3 (1979), forthcoming.

[5]A. H. Rubenstein, et. al. "Explorations on the Information Seeking Style of Researchers," in C. E. Nelson and D. K. Pollock (eds.), Communication Among Scientists and Engineers (Lexington, MA: Heath, 1970), pp. 209-231.

change in assessment of the utility of these information sources; (d) changes in opinion on selected aspects of information searching; and (e) change in assessment of the importance of selected characteristics of various information sources. Most items were worded identically for respondents in both the industrial and academic setting. However, a few items were added (or deleted) from one or the other survey instruments because of some intrinsic differences between the two work settings. A few other items were slightly modified and improved for the academic pretest survey, which was administered somewhat later than the industrial survey and hence offered an opportunity for some minor improvements in questionnaire wording. Where particular questionnaire items were omitted or modified, the data in the following tabular presentations are noted by "N.A." (not applicable) for one of the two sample groups. The actual question wording, and response alternatives, are shown in the Appendix to this report which includes a complete copy of the pretest and posttest instruments.

Methodology

In an ideal controlled experimental research design, study subjects are randomly assigned to an experimental (treatment) group or a control (non-treatment) group. Such procedures essentially randomize the effects of extraneous variables independent of the treatment variable. However, in the present study, use of the treatment (employment of online search services) was necessarily left voluntary, and it was also deemed unsatisfactory to attempt to arbitrarily (randomly) withhold access to the search services by a subset of the scientists and technologists in the two work settings. Consequently, the study is characterized as a quasi-

experimental design, with self-selection of subjects to the treatment or non-treatment stimulus.

This limitation to a quasi-experimental design affects the methodology of the study, and also introduces some problems regarding interpretation of results. Indeed, earlier research[6,7,8] has shown that there are some significant differences among adopters and non-adopters of new innovative literature search capabilities. Indeed, our own study[9] of users and nonusers of the present online bibliographic search services has shown that some aspects of prior information style and attitudes are correlates of subsequent use of the online search services. Hence, in the following analysis, where information style and change in information style are the dependent variables, we are aware of the confounding effect of this variable on the voluntary self-selection to be a user or nonuser of the online services in the quasi-experimental design. Consequently, two distinct methodological strategies for analysis are employed.

The first analysis compares the changes on the sets of measures of information style for those who were online users against those who were not users over the period of the study. The data are also analyzed separately

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[6] D. T. Curtis, "On-Line Retrieval as an Information Source for Bench Bioscientists," OnLine Review, 1 (1974), pp. 279-288.

[7] B. Lawrence, B. H. Weil, and M. H. Graham, "Making On-Line Search Available in an Industrial Research Environment," Journal of the American Society for Information Scientists, 25 (1974), pp. 364-369.

[8] L. W. Stern, C. S. Craig, A. J. LaGreca, and R. C. Salem, "The Effect of Sociometric Location on the Adoption of an Innovation within a University Faculty," Sociology of Education, 49 (1976), pp. 90-96.

[9] Bayer and Jahoda, op. cit.

for those in the industrial setting and those in the academic setting, with special attention being given to the results which were consistent and replicable across work environments. The statistical methodology in this case is simple Chi-square analysis, where the before-measure is cross-tabulated against the after-measure on each information style variable, separately for users and for nonusers, and by work setting.

However, we have earlier established that there is some self-selection to the user or to the nonuser group as a function of prior information style and preferences. Consequently, members of the two groups do not necessarily begin participation in the study project with equivalent, or randomized, status on the pre-test of the dependent variable for the present analysis. That is, a change, as might be detected by the cross-tabular analysis, could be more a function of the differences in the initial (pre-test) measurement level of each group (user or nonuser) rather than attributable to the direct effects of use of online search services.

The second methodological strategy, based on linear regression techniques, partially overcomes these interpretative difficulties. For the regression analyses we have calculated a change score, derived by subtracting the pretest value from the post-test value. However, the possible range of this change measure for any given subject is a function of the pretest level on the initial pretest assessment. That is, on a five-point scale, for example, a person who responded "3" in the pretest would have an upper limit of $\pm$ 2 on the change measure, whereas a person who responded "1" or "5" could have an upper limit of $\pm$ 4 on this change measure. Consistent with similar methodological difficulties with

measurement of change,[10] we have employed the general technique of control for initial level of measurement through partial correlation. That is, we have tabulated the partial correlation between use of online services and our change measure, controlling for the pretest value on the change measure. This technique also partially overcomes the differences in pretest values between self-selected subsequent users and non-users of the search services as described above with regard to cross-tabular analysis.

Unlike cross-tabular analysis, the correlational analysis also assumes a linear relationship between the independent variable and the measure of the degree of change in the criterion measures. However, inspection of the cross-tabulations would suggest that such an assumption generally holds for the present data. Moreover, the correlational analysis also incorporates a somewhat different measure of the independent variable. That is, in the cross-tabular analysis only a dichotomous comparison is made--between nonusers and all users of the online services in the approximately first year after introduction of the search services. In the correlational analysis, the independent variable is continuous, a function of the frequency of use of the online services over the period of the study. Nonusers take on a value of "0". However, among users, the number of searches conducted is highly skewed, with a small number of persons being extremely heavy users. To prohibit these few cases from contributing a disproportionate weight in the regression equations, all high frequency users (5 or more searches over the period) are given the same highest code value on the independent variable (amount of online use).

[10] F. M. Lord, "Elementary Models for Measuring Change," in C. W. Harris (ed.), Problems in Measuring Change (Madison: University of Wisconsin Press, 1963), pp. 21-38.

Results

The analysis of results combines assessment of both methodologies in drawing conclusions on the impact of use of online bibliographic search services on information style. First, we compare the extent of change, and the direction of change, between the users and the nonusers as reflected in the cross-tabular analyses. We then turn to the partial correlation analysis, which controls for possible levels of differences in the pretest measure for change, to detect parallel substantiating results based on a linear model and a more detailed (continuous) measurement of the independent variable (useage rate of online searching over the period). Finally, for both methodologies, we analyze the data separately for those in the industrial setting and those in the academic setting. Consistent with our research objectives in preceding sections of this report, we will be particularly looking for findings of impacts of use of online systems which are generalizable across both work settings. Given the earlier findings, however, we do not expect to uncover a large number of factors which are in fact replicable across settings.

Time Spent in Selected Activities

For both the pretest and the post-test surveys, study participants were asked to report the amount of time spent in an average week on selected information dissemination and gathering activities. Analyses of changes in these activities over the period of the study were made for the amount of time spent in writing or preparing research reports or professional papers, locating information, reading professional literature, and in information discussions with colleagues.

In the industrial setting, both users and nonusers reported spending more time in locating information and in writing reports and papers at the end of the study project than at the beginning. However, parallel changes over time were not reflected among the academic chemists, suggesting that some significant changes in the industrial work setting, beyond merely the introduction of online search capabilities, likely were taking place. The cross-tabular analyses (Table 30) do reflect some other significant changes in the use of the scientists' and technologists' time in the industrial setting which might be related to experience with online searching. That is, users reported spending less time in reading professional literature and in discussion with colleagues, while nonusers reported spending significantly more time in each of these activities. No parallel significant and opposite directional changes were, however, derived for the two groups (users and nonusers) in the academic setting.

The correlational analyses (Table 31) further specify these suggestive relationships. For the academic chemists, no statistically significant impact of online use on time spent in information dissemination and gathering activities was detected. For the industrial group, two significant findings were established. First, the more frequent users of online searching decreased their amount of discussion with colleagues. We would explain this by suggesting that users now had less need to seek out other colleagues for information pertaining to their work. The alternative hypothesis, which these data would suggest be rejected, would have been that users of online searching would be "information rich" and be sought out more by their colleagues for their current knowledge of the literature.

Table 30. Change in Average Time per week Spent in Selected Information Dissemination and Gathering Activities: Users and Nonusers of Online Searching, by Type of Work Setting

vity	Industrial Setting				Academic Setting			
	Direction of Change in Time		Sig. Test of Amount of Change (p-value)		Direction of Change in Time		Sig. Test of Amount of Change (p-value)	
	Users	Nonusers	Users	Nonusers	Users	Nonusers	Users	Nonusers
or preparing ch reports	increase	increase	.03	.01	N.A.	N.A.	N.A.	N.A.
or preparing sional	increase	increase	N.S.	.01	N.A.	N.A.	N.A.	N.A.
or preparing or pro- al papers	N.A.	N.A.	N.A.	N.A.	increase	no change	.001	N.S.
tion	increase	increase	.01	.001	de- crease	no change	.001	N.S.
rofessional ure	de- crease	increase	.001	.001	no change	no change	N.S.	N.S.
discussions agues	de- crease	increase	.01	.001	increase	no change	.02	N.S.

Table 31. Relationship of Amount of Online Use and Change in Time Spent in Selected Information Dissemination and Gathering Activities, Controlling for Initial Amount of Time Spent, by Work Setting

Activity	Industrial Setting		Academic Setting	
	Partial Correlation (controlling for pretest level on change measure)	Test of Significance (p-value)	Partial Correlation (controlling for pretest level on change measure)	Test of Significance (p-value)
Writing or preparing research reports	.245	.001	n.a.	n.a.
Writing or preparing professional papers	.064	n.s.	n.a.	n.a.
Writing or preparing reports or professional papers	n.a.	n.a.	-.028	n.s.
Locating information	.095	n.s.	.021	n.s.
Reading professional literature	-.008	n.s.	.183	n.s.
Informal discussions with colleagues	-.118	.05	-.062	n.s.

Note: On the criterion and control variables, the greater the time spent the higher the score value. Change equals post-test value minus pre-test value.

The other significant correlation for the industrial sample is that users spent substantially more time than formerly on writing and preparing research reports. At least two explanations are possible. First, it is possible that the use of online searching allows more available time for writing as opposed to literature searching. Alternatively, perhaps those with the most need to engage in the writing and preparing of reports are most likely to employ online searching as an adjunct to their efforts. Further research will be needed to ascertain which of these explanations is salient, or whether both might apply in some joint way. Finally, the lack of replication of this result in the academic setting likewise requires further exploration.

Use of Other Information Tools

The study design assessed pre- and post-use of a large array of other traditional sources of information by users and non-users. For the industrial sample, 13 means of gathering or locating information, other than through online searching, were listed; for the academic scientists, 11 other means were assessed. As expected, on practically all types of information sources there was either no change or a decrease in their use by those who elected to use online bibliographic search services (Table 32). As also expected, in the academic setting nonusers of the online services did not significantly alter the extent of their use of any of these more traditional sources of scientific information. However, in the industrial setting, even nonusers of online searching significantly decreased their information-seeking activities with practically all information tools, again suggesting that the work objectives throughout

Table 32 . Change in Frequency of Use of Selected Information Sources: Users and Nonusers of Online Searching, by type of Work Setting

Type of Information Source	Industrial Setting				Academic Setting			
	Direction of Change in Use Frequency		Sig. Test of Amount of Change (p-value)		Direction of Change in Use Frequency		Sig. Test of Amount of Change (p-value)	
	Users	Nonusers	Users	Nonusers	Users	Nonusers	Users	Nonusers
Personal collection of information	decrease	decrease	.001	.01	decrease	no change	.04	N.S.
Manual search of indexes to literature	decrease	decrease	.001	.001	no change	no change	N.S.	N.S.
Scanning of abstract bulletins	decrease	decrease	.001	.001	N.A.	N.A.	N.A.	N.A.
Scanning in-house abstracts	decrease	decrease	.001	.001	N.A.	N.A.	N.A.	N.A.
Scanning of abstract bulletins or tables of contents	N.A.	N.A.	N.A.	N.A.	decrease	no change	.01	N.S.
Scanning primary sources	no change	decrease	N.S.	.001	no change	no change	N.S.	N.S.
Library browsing	decrease	decrease	.01	.001	no change	no change	N.S.	N.S.
Use of citations from other works	decrease	decrease	.001	.001	decrease	no change	.01	N.S.
From business colleague	decrease	decrease	.001	.001	N.A.	N.A.	N.A.	N.A.
From Faculty colleague	N.A.	N.A.	N.A.	N.A.	no change	no change	N.S.	N.S.
From student	N.A.	N.A.	N.A.	N.A.	no change	no change	N.S.	N.S.
From friend outside	decrease	decrease	.001	.001	decrease	no change	.04	N.S.
From immediate supervisor	decrease	decrease	.02	.001	N.A.	N.A.	N.A.	N.A.
From other supervisor	decrease	decrease	.001	.001	N.A.	N.A.	N.A.	N.A.
From technician/ assistant	N.A.	N.A.	N.A.	N.A.	increase	no change	.01	N.S.
From librarian	decrease	decrease	.01	.001	no change	no change	N.S.	N.S.
From technician	decrease	increase	.01	.001	N.A.	N.A.	N.A.	N.A.

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Table 33. Relationship of Amount of Online Use and Change in Frequency of Use of Selected Information Sources, Controlling for Initial Frequency in Use of Sources, by Work Setting

Type Information Source	Industrial Setting: Partial Correlation (controlling for pretest level on change measure)	Industrial Setting: Test of Significance (p-value)	Academic Setting: Partial Correlation (controlling for pretest level on change measure)	Academic Setting: Test of Significance (p-value)
Personal collection of information	.041	n.s.	.173	n.s.
Manual search of indexes to literature	-.013	n.s.	.195	n.s.
Scanning of abstract bulletins	.083	n.s.	n.a.	n.a.
Scanning in-house abstracts	.207	.001	n.a.	n.a.
Scanning of abstract bulletins or tables of contents	n.a.	n.a.	.082	n.s.
Scanning primary sources	.094	n.s.	.178	n.s.
Library browsing	.073	n.s.	.031	n.s.
Use of citations from other works	.082	n.s.	.180	n.s.
From business colleague	-.079	n.s.	n.a.	n.a.
From faculty colleague	n.a.	n.a.	.005	n.s.
From student	n.a.	n.a.	.104	n.s.
From friend outside	.101	.05	.118	n.s.
From immediate supervisor	-.108	.05	n.a.	n.a.
From other supervisor	-.047	n.s.	n.a.	n.a.
From technician/assistant	n.a.	n.a.	.128	n.s.
From librarian	.193	.001	.202	.05
From technician	-.056	n.a.	n.a.	n.a.

Note: On the criterion and control variables, the greater the frequency the higher the score value. Change equals post-test value minus pre-test value.

the industrial setting may have changed dramatically during the course of the research study.

A clearer and more concise summary of the possible impact of online use on subsequent use of more traditional information tools is provided by the correlational analyses (Table 33). For both the industrial and the academic groups, the frequency of use of online searching was significantly correlated with an increasing call on services of a librarian. Apparently, online searching uncovered a substantial amount of literature, and probably literature not generally directly accessible by scientists without assistance, which required greater interaction and intervention by librarians. No other significant correlates of online use were derived for the academic chemists. However, for the industrial scientists and technologists, the more frequent users of online searching significantly increased their contacts with persons outside of their employment setting for information, they increased the amount of time they spent scanning in-house abstracts, and they substantially decreased the amount of time they spent seeking literature information from their immediate supervisor.

Assessment of Value of Other Information Tools

A second similar listed array of traditional information tools as described above was also presented to the study subjects, but in this case they were asked to assess the relative usefulness of those sources. Not surprisingly, those who took the opportunity to use online searching services either then deprecated the utility of the other more traditional information tools, or did not change in their attitude and assessment of these other tools (Table 34). As expected, in the academic

Table 34. Change in Assessment of Utility of Selected Information Sources: Users and Nonusers of Online Searching, by Type of Work Setting

Type of Information Source	Industrial Setting: Direction of Change in Utility Assessment		Industrial Setting: Sig. Test of Amount of Change (p-value)		Academic Setting: Direction of Change in Utility Assessment		Academic Setting: Sig. Test of Amount of Change (p-value)	
	Users	Nonusers	Users	Nonusers	Users	Nonusers	Users	Nonusers
Personal collection of information	no change	less	N.S.	.02	no change	no change	N.S.	N.S.
Manual search of indexes to lit.	less	less	.001	.001	no change	no change	N.S.	N.S.
Scanning of abstract bulletins	less	more	.001	.01	N.A.	N.A.	N.A.	N.A.
Scanning of in-house abstracts	less	less	.001	.001	N.A.	N.A.	N.A.	N.A.
Scanning of abstract bulletins or tables of contents	N.A.	N.A.	N.A.	N.A.	less	no change	.05	N.S.
Scanning of primary sources	no change	less	N.S.	.001	no change	no change	N.S.	N.S.
Library browsing	less	less	.01	.001	no change	no change	N.S.	N.S.
Use of citations from other works	less	less	.01	.001	no change	no change	N.S.	N.S.
From business colleague	less	less	.01	.01	N.A.	N.A.	N.A.	N.A.
From faculty colleague	N.A.	N.A.	N.A.	N.A.	no change	no change	N.S.	N.S.
From student	N.A.	N.A.	N.A.	N.A.	less	no change	.01	N.S.
From friend outside	less	less	.01	.01	no change	no change	N.S.	N.S.
From immediate supervisor	less	no change	.01	N.S.	N.A.	N.A.	N.A.	N.A.
From other supervisor	less	less	.02	.001	N.A.	N.A.	N.A.	N.A.
From techn/assist.	N.A.	N.A.	N.A.	N.A.	no change	no change	N.S.	N.S.
From librarian	less	less	.01	.001	no change	no change	N.S.	N.S.
From technician	no change	less	N.S.	.001	N.A.	N.A.	N.A.	N.A.
Online bibliographic data base	more	less	.01	.001	no change	no change	[illegible]	N.S.
Computerized current awareness service	N.A.	N.A.	N.A.	N.A.	no change	no change	N.S.	N.S.

Table 35. Relationship of Amount of Online Use and Change in Assessment of Utility of Selected Information Sources, Controlling for Initial Assessment of Utility, by Work Setting

Type of Information Source	Industrial Setting		Academic Setting	
	Partial Correlation (controlling for pretest level on change measure)	Test of Significance (p-value)	Partial Correlation (controlling for pretest level on change measure)	Test of Significance (p-value)
Personal collection of information	.060	n.s.	.217	.05
Manual search of indexes to literature	.059	n.s.	.055	n.s.
Scanning of abstract bulletins	.083	n.s.	n.a.	n.a.
Scanning of in-house abstracts	.190	.001	n.a.	n.a.
Scanning of abstract bulletins or tables of contents	n.a.	n.a.	.176	n.s.
Scanning of primary sources	.123	.05	.196	.05
Library browsing	.063	n.s.	.132	n.s.
Use of citations from other works	.141	.01	.241	.05
From business colleague	-.001	n.s.	n.a.	n.a.
From faculty colleague	n.a.	n.a.	-.003	n.s.
From student	n.a.	n.a.	.057	n.s.
From friend outside	-.012	n.s.	.233	.05
From immediate supervisor	-.073	n.s.	n.a.	n.a.
From other supervisor	-.071	n.s.	n.a.	n.a.
From technician/assistant	n.a.	n.a.	.205	.05
From librarian	.143	.01	.158	n.s.
From technician	-.078	n.s.	n.a.	n.a.
Online bibliographic data base	.574	.001	.555	.001
Computerized current awareness service	n.a.	n.a.	.087	n.s.

Note: On the criterion and control variables, the greater the assessment of utility the higher the score value. Change equals post-test values minus pre-test values.

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setting nonusers did not significantly change in their assessment of the utility of any of the other more traditional resources. Again, inexplicably, in the industrial setting, even nonusers of the online search service often significantly reduced their assessment of utility of the more traditional means of information seeking (except for the scanning of abstract bulletins, which nonusers thought were significantly more useful at the end of the study period than they had formerly thought).

Of the initial array of traditional information tools, the correlational analyses indicate that there are only two which are statistically significant and in the same direction in both environments (Table 35). That is, the frequent users of online searching in both the academic and the industrial settings significantly increased their assessment of the utility of scanning primary sources and the use of citations from other works. The academics who were frequent users also increased their assessments, relative to infrequent users and nonusers, of the value of their personal collection of information, friends outside of their work setting, and the utility of their technicians or assistants as information sources. In the industrial setting, more frequent users increased their assessment of the value of in-house abstracts and the company librarians as sources of information.

Finally, in both settings the most frequent users of the online services could be characterized as enthusiastic converts (most of whom were initially skeptics) in their assessment of the utility of online bibliographic data bases for their work. In both settings, the partial correlation between the frequency of use of online search and the pre- to post-change in the appraisal of the utility of online searching was

more than .55 (Table 35). This is the highest correlation coefficient derived by these analyses, and is statistically significant beyond the .001 level. This substantial change and apparent enthusiasm for the services offered through this study project clearly explains why both organizations, upon completion of the present study, have opted to install online search capability as a permanent feature in the work setting.

Assessed Importance of Information Source Characteristics

In both the pre- and the post-assessment, the study participants were asked to rank the importance of various characteristics of information sources on a four-point scale (essential, very important, some importance, not important). Seven characteristics were evaluated: local availability, up-to-dateness, response time in obtaining a citation or abstract, response time in obtaining a full copy of an original document, accuracy/authoritativeness, comprehensiveness/completeness, and direct useability without librarian assistance. In the cross-tabular analyses, industrial scientists and technologists, both users and nonusers, generally tended to decrease their assessment of importance of practically all of these characteristics (Table 36). However, the correlational analysis for the industrial sample (Table 37) indicates a greater amount of decrease in ratings of importance for most of these traits by the control (nonuser) group. That is, the less frequent the use of online searching, the greater the degree of change toward assessed non-importance of information sources being up-to-date, accurate and authoritative, comprehensive and complete, and either the citation, abstract, or full document being promptly available.

Table 36. Change in Assessment of Importance of Characteristics of Information Sources: Users and Nonusers of Online Searching, by Type of Work Setting

Characteristics	Industrial Setting: Direction of Change in Importance		Industrial Setting: Sig. Test of Amount of Change (p-value)		Academic Setting: Direction of Change in Importance		Academic Setting: Sig. Test of Amount of Change (p-value)	
	Users	Nonusers	Users	Nonusers	Users	Nonusers	Users	Nonusers
Local Availability	no change	less	N.S.	.01	no change	no change	N.S.	N.S.
Up-to-dateness	less	no change	.01	N.S.	less	no change	.02	N.S.
Response time (citation/abstract)	less	less	.001	.02	no change	no change	N.S.	N.S.
Response time (full document)	less	less	.001	.001	no change	no change	N.S.	N.S.
Accuracy/ Authoritativeness	less	less	.01	.001	no change	less	N.S.	.001
Comprehensiveness/ Completeness	less	less	.001	.001	no change	no change	N.S.	N.S.
Direct Useability w/o assistance	less	less	.001	.001	no change	no change	N.S.	N.S.

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Table 37. Relationship of Amount of Online Use and Change in Assessment of Importance of Characteristics of Information Sources, Controlling for Initial Assessment of Importance, by Work Setting

Characteristics	Industrial Setting		Academic Setting	
	Partial Correlation (controlling for pretest level on change measure)	Test of Significance (p-value)	Partial Correlation (controlling for pretest level on change measure)	Test of Significance (p-value)
Local Availability	.080	n.s.	.191	.05
Up-to-dateness	.097	.05	.178	.05
Response time (citation/abstract)	.151	.01	.199	.05
Response time (full document)	.134	.01	.089	n.s.
Accuracy/Authoritativeness	.102	.05	.250	.01
Comprehensiveness/Completeness	.156	.01	.239	.05
Direct Useability w/o assistance	-.070	n.s.	.116	n.s.

Note: On the criterion and control variables, the greater the degree of assessed importance the higher the score value. Change equals post-test value minus pre-test value.

In contrast to the industrial sample, the cross-tabular analyses for the academic sample produced few statistically significant changes when the user group and the nonuser group were each analyzed separately (Table 36). However, the sample size for each subgroup is relatively small, and hence the correlational analyses which combine both groups and provide more robust statistics are more instructive. The results of the correlational analyses (Table 37) for the academics largely parallel the results for the industrial scientists and technologists. That is, less frequent users of online services were more likely to downgrade the importance of information sources being up-to-date, accurate and authoritative, and comprehensive and complete. The more frequent online users in the academic setting were also more likely to value the local availability of informational resources and more likely desired quicker response time for obtaining citations or abstracts than did the less frequent users.

Assessment of Other Aspects of Information Searching

The last set of analyses addresses the changes on three other questions pertaining to the existing environment for information searching as related to the use of online bibliographic searching. All study participants were asked in both the pre- and post-surveys to (1) assess the adequacy of existing means of locating information in their setting, (2) assess the utility of a librarian and information specialist, and (3) assess the general advantageousness of performing one's own information search. Again, the cross-tabular results (Table 38) are generally unclear: the statistical results are based on substantially large sample size differences between users and nonusers and between the two work settings.

Table 38. Change [illegible] of Agreement with Selected Items on Information Searchi[illegible]ers and Nonusers of Online Searching, [illegible]ype of Work Setting

Item	Industrial Setting				Academic Setting			
	Direction of Change in Agreement		Sig. Test of Amount of Change (p-value)		Direction of Change in Agreement		Sig. Test of Amount of Change (p-value)	
	Users	Nonusers	Users	Nonusers	Users	Nonusers	Users	Nonusers
Present means of locating scientific information are adequate	no change	higher	N.S.	.001	no change	lower	N.S.	.03
Librarian/information specialist serves useful function	higher	higher	.02	.01	no change	no change	N.S.	N.S.
Advantageous to perform one's own information search	lower	lower	.001	.01	no change	lower	N.S.	.05

Table 39. Relationship of Amount of Online Use and Change in Level of Agreement with Selected Items on Information Searching, Controlling for Initial Level of Agreement, by Work Setting

Item	Industrial Setting		Academic Setting	
	Partial Correlation (controlling for pretest level on change measure)	Level of Significance (p-value)	Partial Correlation (controlling for pretest level on change measure)	Level of Signifiance (p-value)
Present means of locating scientific information are adequate	.171	.01	.230	.05
Librarian/information specialist serves useful function	.188	.001	.101	n.s.
Advantageous to perform one's own information search	.086	n.s.	.184	n.s.

Note: On the criterion and control variables, the greater the degree of agreement the higher the score value. Change equals post-test value minus pre-test value.

Moreover, the self-selective nature of the experimental (user) and control (nonuser) groups resulted in some substantial differences between the two as regards the pretest responses on these items.

In contrast, the correlational analyses (Table 39) are instructive. In all cases, positive correlation coefficients were obtained, indicating that frequent online users were more likely to change positively in their assessment of the value of all these measured aspects. The more frequent online users, in both work settings, were significantly more likely to be more satisfied with the adequacy of means of locating information after introduction and use of the online searching capabilities. In the industrial setting, statistically significant positive changes were exhibited with regard to the frequent online users' assessments of the services of librarians and information specialists; a parallel relationship emerged for the academic chemists, but did not reach statistical significance. Similarly, for both the industrial and the academic groups, small positive, but not statistically significant, results are shown between frequency of online use and agreement that it is advantageous to perform one's own information search.

Summary and Conclusion

The foregoing analyses focus on the impact of use of online bibliographic searching on subsequent information style and information preferences in two distinct environments. The methodological approach is basically that of a quasi-experimental design, with pre- and post-assessment, supplemented by correlational analysis to adjust for differences in the self-selection to the experimental (users of o[illegible]

services) and the control (nonusers) groups. In this summary, we focus on those findings which are statistically significant, based on the correlational analyses, and which are mirrored across both settings (industrial and academic). In the cases where the findings are duplicated across organizational settings, we presume relatively broad generalizability of results.

Across both settings, there was generally no consistent effect of online searching on the time spent in other information dissemination and gathering activities. For both industrial and academic users, however, there was significantly greater reliance on librarians than formerly. Apparently, online searching uncovered more literature references than did the means employed prior to the introduction of online searching, and likely these additional bibliographic references were not generally directly accessible to the users without librarian assistance. Consequently, organizations which plan to adopt online bibliographic searching capability should perhaps also simultaneously plan to enhance librarian and information specialist assistance.

As compared to nonusers and infrequent users, frequent users in both settings also increased their assessment of the utility of citations from other works and the scanning of primary sources as important sources of information. Not surprising, the most frequent users of online search services also most increased their appraisal of the utility of online systems to their work. Clearly, a substantial degree of enthusiasm for online searching was generated in both settings through the introduction of the opportunity to use these services.

In both settings, users increased their appraisal of the adequacy

of information services available to them. They also increased their value on using information searching tools which are up-to-date, provide quick turnaround in reporting citations or abstracts, are accurate and authoritative, and that are relatively comprehensive and complete. All of these traits are ones considered as primary benefits offered by online bibliographic searching. In conclusion, given the high value now placed on some of the primary attributes of online bibliographic searching, and the overall change in increased enthusiasm for online services by users over the study period, it is not surprising that upon completion of this study project both organizations have elected to install online search capability as a permanent feature in the work setting.

The results from this study are by no means definitive, however. First, there is need for further longitudinal study of the effects of online searching and other recent technological innovations for literature searching which is based on true experimental designs. That is, studies based on random assignments of subjects to treatment and non-treatment groups, or the assignment of matched pairs to respective different treatments, is recommended for future research.

Finally, our attention in this section of the report has been on attempting to assess the impact of the availability and use of online search services on scientists' subsequent information styles and attitudes. Ultimately, however, new tools for scientific information searching are largely introduced in order to enhance the work of scientists and the advancement of science. Therefore, future research should focus on related longer range criteria--measures of scientific productivity and the impact of the scientific enterprise, as it may be enhanced by new

information dissemination tools, on the development and progress in science and knowledge.

SUMMARY AND CONCLUSIONS

Online searches were conducted in an academic setting, the Chemistry Department of the Florida State University, and in an industrial setting, the Monsanto Textile Company. The study was conducted in three phases. In Phase I, conducted in both the academic and industrial settings, free to the users, mediated (searched by information specialists) searches were provided. Records of 353 searches conducted for 50 academic users over an eleven month period are analyzed. Records of 345 searches conducted for 109 industrial users over a period of 13 months are analyzed. Prior to the start of online search service, scientists and technologists were asked to complete a questionnaire dealing mostly with questions about their information style. A similar questionnaire was distributed to the scientists and technologists in both settings after the completion of Phase I. A number of users and non-users of online search service were also interviewed prior to the start of Phase II. In Phase II of the study, conducted only in the academic environment, 155 searches for 57 users were collected during a seven and a half month period. The Phase II searches were conducted by information specialists and the users were charged half the cost of computer connect and offline printing charges. In Phase III, also conducted only in the academic setting, records of 87 searches for 44 users were collected during a one and one-half month period. Phase III searches were conducted by the final users of the information (non-mediated searches) and were free to the users. Selected results will now be summarized.

Prediction of Users of Online Search Service

Despite a broad array of data on personal and professional background, established information styles and appraisal of adequacy of information resources, and measures of prior attitudes and experience with online search

collections, and discussion with colleagues prior to requesting an online search and less negotiation time per search. Searches by heavy industrial users (10 or more searches per user) did not have these differentiating characteristics.

Calendar Age of Users

In the analysis by calendar age of users, younger academic users (27 years or younger) had fewer requests in written form, fewer author constraints, fewer exhaustive and current awareness searches, and fewer searches of data bases other than CHEMCON. The number of searches for younger industrial users was too small for statistical analysis.

Professional Age of Users

In the analysis by professional age (the number of years since the highest degree was received) the younger academic professional users (6 or fewer years since highest degree was received) submitted fewer requests in writing, had the fewest requests for current awareness searches, and searches for facts, and the highest number of uses for a few references on a topic and for procedures, methodology, and apparatus. Younger academic users made more searches of the printed indexes prior to requesting online searches, required the highest amount of negotiation time, and were more satisfied with the currency and utility of search results. Professionally younger industrial users planned to look up a larger number of potentially relevant citations [illegible]rieved than other age groups of industrial users.

Position of Users

In the analysis of user by position of academic users, fewer student requests were submitted in writing, more of the student uses entailed user interaction during searches, student uses required more negotiation time, and fewer student uses were preceded by searches of personal document

services, the analysis of correlates of who would and who would not use online services yielded relatively low predictive power. Moreover, there was little similarity, or replicability, between the correlates in one setting (industrial or academic) and the correlates in the other setting. In neither setting, based on a multiple regression model, could as much as 25 percent of the variance (R^2) be explained in subsequent use or nonuse of the online bibliographic search service. Hence these results tend to confirm the earlier findings of both Curtis and Stern et al regarding generally negligible differences between users and nonusers of computer-readable bibliographic data bases, eith online or batch.

Nevertheless, in broad terms, these results do suggest that prior information "style," satisfaction with more traditional information resources, and attitudinal predisposition to the possible utility of online search services, have some small effect on subsequent usage of online services.

Effect of Online System Use on Users' Information Style

The methodological approach is basically that of a quasi-experimental design with pre- and post-assessment supplemented by correlational analysis to adjust for differences in the self-selection to the experimental (users of online services) and the control (non-users) groups. Findings based on correlational analysis that are statistically significant for the academic and industrial settings are summarized. Across both settings, there was generally no consistent effect of online searching on time spent in other information-disseminating and gathering activities. For both industrial and academic users, however, there was significantly greater reliance on librarians than formerly. As compared to non-users and infrequent users of online search services, frequent users in both settings increased their assessment of the utility of citations from

other works and the scanning of primary sources as important sources of information, not surprising, the most frequent users of online search services also most increased their favorable appraisal of the utility of online search services to their work. In both settings, online search service users increased their favorable appraisal of the adequacy of information services available to them. They also increased their value of using information searching tools that are up-to-date, provide quick turn around time in reporting citations or abstracts, are accurate and authoritative, and are relatively comprehensive and complete.

Phase I Results

In comparing academic with industrial users, it was found that, among other things, academic users had more author and time constraints There were more exhaustive searches and more searches for a few references on a topic, but fewer searches for specific facts or procedures by academic users. More academic than industrial users were present and interacted during searches.

Time of Use

Later academic uses (uses made after three months of search service) consisted of a larger number of delegated searches, more searches with constraints and a time period to search and greater utilization of search results for other than research purposes. Later industrial uses did not resemble later academic searches in these ways. In comparison with the early industrial uses, later industrial uses were preceded by fewer manual searches.

Frequency of Use

In the analysis by frequency of use, searches by heavy academic (10 or more searches per user) users had more time constraints, more uses for other than research, fewer searches of manual indexes, personal document

collections or discussions with colleagues. In the industrial setting, supervisors were more likely to call in requests by phone than non-supervisors, less likely to use the system for either current awareness or procedures, methods, and methodology, and more likely to use the older literature.

Phase II Results

Phase II uses (half cost, mediated) in comparison with Phase I uses (free, mediated) had more search requests submitted with synonyms and search logic, more date constraints, greater use for current awareness and for learning about a new specialty, for theory, and for specific facts. Phase II uses also entailed more negotiation time, less connect time and fewer off-line citations. Phase II users were less satisfied with the size but more satisfied with both the currency and the utility of the output of Phase II than Phase I search results.

Phase III Results

In comparison with Phase I uses (free, mediated), Phase III uses (free, non-mediated) were conducted more extensively for current awareness, for brushing up on a subject, for learning a new specialty, and for theory, facts, and procedures. Greater use was made of manual indexes, including personal document collections, and discussion with colleagues prior to conducting Phase III searches. Phase III searches used more search statements and computer connect time and were judged less satisfactory in terms of size but more satisfactory in terms of utility of search output than Phase I search results. Two other findings that could be observed from the use records and that held for both academic and industrial settings and for all three phases of the study are also highlighted in this section. They are the percentage of searches that

were delayed because of technical problems and the percentage of searches that, according to the user, had relevant but not retrieved document citations. In Phase I, conducted in 1976 and 1977, 24% of the academic searches and 17% of the industrial searches were delayed because of technical problems while the figure for Phase III, searches conducted in 1978, was 16%. Delays were caused by telephone, telecommunication, and computer problems.

In both settings and all three phases of the study a high percentage of the search results failed to include relevant documents known to the users. Based on the analysis of user feedback forms, 42% of the Phase I academic uses, 57% of the Phase I industrial searches, 41% of the Phase II searches, and 52% of the Phase III searches failed to retrieve known relevant documents.

Despite these problems, user satisfaction with search results was high. Size of search output was about right in approximately two-thirds of the Phase I and II searches and in over half of the Phase III searches. Eighty-four to ninety-two percent of all the searches were considered very satisfactory or satisfactory in terms of currency of search output and seventy-six to seventy-eight percent of all the searches were considered very satisfactory or satisfactory in terms of utility of search output.

Online search service was taken over by the Company library in the industrial setting and is now one of the information services offered to Company employees. The Chemistry Department voted to take over (and pay for) the online service in the academic setting. At the time of this writing (March 1979) the Chemistry Department is providing online services on a self-search basis, with a charge to users to recover some costs.

APPENDICES

Summary of Data from Information Specialist's Record

of Online Use

Item	Free Mediated, Phase I Industrial N=345 uses	Free Mediated, Phase I Academic N=353 uses	Half-Cost Mediated Phase II N=155 uses	Free Non-Mediated Phase III N=87 uses
Search request received				
In writing	23.2%	60.6%	41.7%	17.2
In person	67.8	91.2	80.1	100.0
By phone	15.9	0.0	0.6	0.0
By other than final user	2.3	7.9	14.1	6.9
Relation to prior searches				
New search	72.4	69.7	70.5	74.7
Continuation	16.3	11.6	19.2	11.5
Modification	11.3	15.3	5.1	11.5
User assistance				
Synonyms supplied	56.8	43.3	57.7	41.4
Logic supplied	16.8	22.4	31.4	40.2
Search constraints				
English only	2.3	0.8	1.3	4.6
Author	6.7	19.8	9.6	19.5
Publication type	5.8	0.0	0.0	0.0
Maximum number	2.6	1.7	0.6	0.0
Time period	1.2	11.3	20.5	4.6
Other	1.2	5.7	5.1	
Purpose of search				
Teaching	0.0	2.0	2.6	
Research	100.0	85.0	85.3	85.1
Other, course related	0.0	2.8	2.6	
Other, not course related	0.0	8.5	3.8	
Type of search				
Current awareness	9.0	12.7	26.9	28.7
Exhaustive	33.3	49.6	42.9	50.6
A few references, browsing	13.6	22.1	14.7	21.8
Specific facts, procedures	39.1	13.9	14.7	12.6
Purpose of use				
Stay current, own area	40.6	52.7	58.3	62.1
Stay current, related area	10.4	16.7	18.6	24.1
Brushing up	8.4	8.8	12.2	19.5
Learn new specialty	18.6	19.8	36.5	43.7
Support ongoing work-theory	12.5	18.7	43.6	36.8
Support ongoing work-facts	25.1	36.3	59.0	56.3
Support ongoing work-procedures	53.0	24.6	44.9	41.4

Information Specialist's Record (cont.)

Item	Free Mediated, Phase I Industrial	Free Mediated, Phase I Academic	Half-Cost Mediated Phase II	Free Non-Mediated Phase III
Preparation for				
Internal meeting	2.6	4.8	7.1	6.9
Internal report	4.6	0.8	4.5	5.7
Potential application	1.7	0.0	0.0	0.0
Publication	5.2	32.6	37.2	20.7
Dissertation	0.6	20.1	19.2	10.3
Grant proposal	0.0	5.7	5.1	1.1
Testing system	0.9	0.3	0.0	0.0
Other	8.1	12.7	5.8	11.5
Sources used prior to online search				
Manual search of indexes	22.6	27.8	36.5	42.5
Online system aids	3.5	0.8	0.6	18.4
Personal collection	40.6	34.8	42.9	47.1
Discuss with colleague	38.3	22.7	27.6	43.7
Internal company report	9.6			
Search negotiation time (min.)				
None	NR	11.9	25.0	
1-2	NR	28.9	8.3	
2-3	NR	25.5	26.3	
4+	NR	33.7	40.4	
Files used				
CHEMCON	83.5	94.6	98.1	95.4
CHEM7071	28.7	24.9	17.9	23.0
COMPENDEX	10.1	0.3	0.6	0.0
AGRICOLA	0.0	0.3	0.0	0.0
BIOSIS	0.0	1.1	9.6	16.1
CDI	0.0	0.3	0.0	1.1
GRANTS	0.0	0.8	0.0	0.0
NTIS	4.3	0.3	0.0	0.0
POLLUTION	1.4	0.6	1.9	0.0
SSIE	1.2	3.4	0.0	1.1
Search statements used				
1-3	12.5	28.0	28.8	14.9
4-7	29.0	26.6	31.4	28.7
8-12	24.6	24.4	17.3	24.1
13+	31.6	21.0	21.8	31.0

Information Specialist's Record (cont.)

Item	Free Mediated, Phase I Industrial	Free Mediated, Phase I Academic	Half-Cost Mediated Phase II	Free Non-Mediated Phase III
Citations printed				
Online				
0-3	36.8	26.1	34.6	14.9
4-10	37.1	23.8	23.1	28.7
11-20	20.0	24.9	17.9	26.4
21+	6.1	25.2	24.4	29.9
Offline	63.2	36.3	26.9	41.4
Terminal connect time (min.)				
1-7	20.9	22.1	39.1	11.5
8-13	28.4	28.3	28.2	19.5
14-23	29.6	24.6	17.9	24.1
24+	19.7	24.9	14.1	44.8
Post-search staff time with user (min.)				
1-2	0.3	25.5	10.9	
2+	0.6	13.0	17.3	2.3
User present for search				
In person	44.6	70.0	66.7	100.0
By phone	1.7	0.0	1.3	0.0
User interaction during search	43.2	71.1	65.4	100.0
Search delay due to technical problems	17.4	23.8	24.4	16.1
Delay due to:				
Log-on	1.7	10.8	7.7	2.3
Tymshare	6.4	9.6	0.6	0.0
Disconnect	2.9	4.2	8.3	8.0
Terminal malfunction	0.0	0.8	0.0	0.0
Host down	1.7	2.5	7.1	3.4
Data base not available	0.6	0.3	0.6	0.0
Telephone problems	4.3	2.0	2.6	0.0
Other	0.9	2.5	2.6	3.4
Number of citations retrieved				
0-8	22.3	24.4	35.9	18.4
9-23	27.8	25.5	25.6	25.3
24-65	25.2	31.4	17.3	23.0
66+	24.6	18.7	21.2	33.3

Summary of Data from User's Reaction Form

Item	Free Mediated, Phase I Industrial	Free Mediated, Phase I Academic	Half-Cost Mediated Phase II	Free Non-Mediated Phase III
Citations familiar prior to search				
0	41.4	30.6	41.0	NR
1-2	12.2	19.5	19.2	18.4
3-6	14.8	19.5	15.4	17.2
7+	31.6	30.3	24.4	31.0
New citations				
0-2	28.4	26.9	35.9	27.6
3-8	21.7	24.4	25.0	23.0
9-18	18.3	19.8	14.7	17.2
19+	31.6	28.9	24.4	32.2
Known citations not retrieved	56.5	41.9	41.0	48.3
Citations to investigate further				
0-2	34.2	28.6	36.5	32.2
3-5	18.8	21.8	20.5	25.3
6-12	16.8	21.0	14.1	10.3
13+	30.1	28.6	28.8	32.2
Opinion on number retrieved				
About right	64.3	68.3	68.6	56.3
Too many	5.5	7.1	7.7	8.0
Not enough	19.4	13.0	19.9	31.0
Opinion on currency				
Very satisfactory	34.8	43.9	44.9	33.3
Satisfactory	49.3	43.1	46.8	52.9
Unsatisfactory	3.2	1.1	1.9	5.7
Highly unsatisfactory	1.7	0.3	1.3	0.0
Opinion on utility of results				
Very satisfactory	50.4	53.8	53.2	54.0
Satisfactory	24.9	24.1	33.3	33.3
Unsatisfactory	9.6	7.6	5.8	10.3
Highly unsatisfactory	5.5	4.8	7.1	1.1

RESPONSES TO PRE- AND POST-TREATMENT QUESTIONNAIRES

Response Category	Industrial Sample		Academic Sample	
(Not all questions were asked on both pre- and post-tests)	Pre-test N = 262	Post-test N = 233	Pre-test N = 70	Post-test N = 50
Sex				
Male	255	NA	61	NA
Female	5	"	9	"
NR	2	"	--	"
Highest Degree				
Less than col.	6	"	--	"
Bachelors	114	"	21	"
Masters	57	"	7	"
Doct. w/o Dis.	--	"	2	"
Ph.D.	83	"	39	"
Other doct.	1	"	1	"
Other	--	"	--	"
NR	1			
Field of highest degree				
Organic chem.	21	"	8	"
Inorganic chem.	2	"	3	"
Biochemistry	1	"	7	"
Chem. engineering	61	"	--	"
Physical chemistry	7	"	5	"
Chem./other chem.	64	"	44	"
Mech. engineering	38	"	--	"
Other engineering	28	"	--	"
Physics	5	"	1	"
Other phys. sci.	3	"	1	"
Business/admin.	9	"	--	"
All other	12	"	1	"
NR	11	"	--	"
Year of highest degree				
1901-1940	10	NA		NA
1941-50	29	"		"
1951-60	83	"		"
1961-65	37	"		"
1965-70	43	"		"
1971+	60			
Year since continuous service at MTC/FSU				
1901-40	4	"		"
1941-50	5	"		"
1951-60	96	"		"
1961-65	59	"		"
1965-70	43	"		"
1971+	55	"		

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Present job designation			**Present position**		
Supervisory technician (Foreman, Lab. Supervisor)	--	NA	Full Prof.	15	10
Supervisory C/E Group Leader (Supervisor Nylon Development)	45	"	Assoc. Prof.	6	5
Supervisory C/E Senior Group Leader, Senior Research Group Leader	15	"	Asst. Prof.	4	3
Supervisory C/E Manager (Research Manager)	8	"	Postdoc. Fellow	4	1
Non-supervisory technician (research technician, Senior engineering, Processing technician)	2	"	Doct. Cand./ Student	26	12
Non-supervisory C/E (Bench chem. engineer, A, B; Engineer I, II; Chemist II)	28	"	Res. Assoc.	12	8
Non-supervisory C/E Senior (senior mechanical engineer, polymer physicist, senior research chemist)	83	"	Other	3	1
Non-supervisory specialist	51	"			
Non-supervisory senior specialist	22	"			
Non-supervisory scientist/ science or engineering fellow	8	"			
Time spent on Administration					
None	60	34		42	31
1-4 hrs.	81	87		15	11
5-8 hrs.	41	39		5	5
9-12 hrs.	25	23		3	1
13-16 hrs.	12	16		--	--
17-20 hrs.	12	10		--	--
21-24 hrs.	3	4		1	--
25-28 hrs.	3	3		--	--
29-32 hrs.	--	4		--	--
33 + hrs.	1	--		1	--
NR	24	13		3	2

Response Category	Industrial Sample		Academic Sample	
	Pre-test N - 262	Post-test N = 233	Pre-test N = 70	Post-test N = 50
Work in Laboratory				
None	61	52	NA	NA
1-4 hrs.	35	41	"	"
5-8 hrs.	25	22	"	"
9-12 hrs.	28	30	"	"
13-16 hrs.	25	18	"	"
[illegible]-20 hrs.	14	16	"	"
21-24 hrs.	20	13	"	"
25-28 hrs.	9	6	"	"
29-32 hrs.	8	10	"	"
33 + hrs.	8	6	"	"
NR	29	19		
Research Reports				
None	30	37	"	"
1-4 hrs.	89	74	"	"
5-8 hrs.	74	61	"	"
9-12 hrs.	28	30	"	"
13-16 hrs.	7	10	"	"
17-20 hrs.	3	4	"	"
21-24 hrs.	1	1	"	"
25-28 hrs.	1	--	"	"
29-32 hrs.	--	--	"	"
33 + hrs.	--	--	"	"
NR	29	16	"	"
Professional Papers				
None	125	119	"	"
1-4 hrs.	56	56		
5-8 hrs.	11	17	"	"
9-12 hrs.	6	2	"	"
13-16 hrs.	2	--	"	"
17-20 hrs.	--	--	"	"
21-24 hrs.	--	--	"	"
25-28 hrs.	--	--	"	"
29-32 hrs.	--	--	"	"
33 + hrs.	--	--	"	"
NR	62	39		
Locating Information				
None	3	4	1	--
1-4 hrs.	135	126	43	34
5-8 hrs.	69	68	19	11
9-12 hrs.	30	22	4	3
13-16 hrs.	7	6	--	--
17-20 hrs.	--	--	--	--
21-24 hrs.	--	--	--	--
25-28 hrs.	1	--	--	--
29-32 hrs.	--	--	--	--
33 + hrs.	--	--	--	--
NR	17	7	3	2

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Reading Professional literature				
None	1	--	--	--
1-4 hrs.	119	116	27	20
5-8 hrs.	89	80	18	13
9-12 hrs.	30	25	17	10
13-16 hrs.	11	8	5	4
17-20 hrs.	2	1	1	1
21-24 hrs.	--	1	--	--
25-28 hrs.	--	--	1	1
29-32 hrs.	1	--	--	--
33 + hrs.	--	--	--	--
NR	9	2	1	1
Dept./Project meetings				
None	12	9	NA	NA
1-4 hrs.	146	121	"	"
5-8 hrs.	61	58	"	"
9-12 hrs.	19	28	"	"
13-16 hrs.	3	6	"	"
17-20 hrs.	3	3	"	"
21-24 hrs.	—	—	"	"
25-28 hrs.	1	1	"	"
29-32 hrs.	--	--	"	"
33 + hrs.	--	--	"	"
NR	17	7	"	"
Lab research/Analysis				
None	NA	NA	4	2
1-4 hrs.	"	"	6	4
5-8 hrs.	"	"	7	5
9-12 hrs.	"	"	6	4
13-16 hrs.	"	"	3	3
17-20 hrs.	"	"	7	5
21-24 hrs.	"	"	4	4
25-28 hrs.	"	"	5	5
29-32 hrs.	"	"	4	2
33 + hrs.	"	"	20	13
NR	"	"	4	3
Writing				
None	"	"	11	9
1-4 hrs.	"	"	29	20
5-8 hrs.	"	"	14	9
9-12 hrs.	"	"	7	5
13-16 hrs.	"	"	5	4
NR	"	"	4	3
Meetings				
None			23	18
1-4 hrs.	"	"	40	27
5-8 hrs.	"	"	4	3
NR			3	2

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Informal Discussions				
None	3	2	--	--
1-4 hrs	98	87	34	25
5-8 hrs.	102	90	27	20
9-12 hrs.	36	34	5	1
13-16 hrs.	7	14	--	--
17-20 hrs.	4	2	1	1
21-24 hrs.	1	--	--	--
25-28 hrs.	1	1	--	--
NR	10	3	3	3
Teaching				
None	NA	NA	35	22
1-4 hrs.	"	"	2	2
5-8 hrs.	"	"	4	3
9-12 hrs.	"	"	10	7
13-16 hrs.	"	"	8	6
17-20 hrs.	"	"	5	4
21-24 hrs.	"	"	2	2
25-28 hrs.	"	"	1	1
NR	"	"	3	3
Advising Students				
None	"	"	38	26
1-4 hrs.	"	"	11	7
5-8 hrs.	"	"	12	12
9-12 hrs.	"	"	5	2
13-16 hrs.	"	"	--	--
17-20 hrs.	"	"	6	--
NR	"	"	3	3
Attend Class				
None	"	"	41	25
1-4 hrs.	"	"	9	7
5-8 hrs.	"	"	4	3
9-12 hrs.	"	"	3	3
13-16 hrs.	"	"	1	1
NR	"	"	12	11
Other				
None	13	12	6	4
1-4 hrs.	7	2	2	2
5-8 hrs.	14	10	2	1
9-12 hrs.	16	9	--	--
13-16 hrs.	8	7	--	--
17-20 hrs.	8	6	1	1
21-24 hrs.	2	1	1	1
25-28 hrs.	8	2	--	--
29-32 hrs.	3	5	--	--
33 + hrs.	5	--	2	1
NR	178	179	56	40

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Number of job titles in previous 5 years				
One	44		NA	NA
Two	43		"	"
Three	41		"	"
Four	32		"	"
Five	25		"	"
Six	5		"	"
Seven	4		"	"
Eight	9		"	"
None	43		"	"
NR	16		"	"
Types of work since highest degree				
College teaching - yes	10	NA	10	"
Otherwise	252	"	60	"
College Research - yes	11	"	27	"
Otherwise	251	"	43	"
College Teaching/Research	16	"	30	"
Otherwise	246	"	40	"
R&D Business	191	"	5	"
Otherwise	71	"	65	"
R&D government	14	"	5	"
Otherwise	248	"	65	"
Executive/Administrator	28	"	--	"
Otherwise	234	"	70	"
Other Professional	44	"	3	"
Otherwise	218	"	67	"
Student	23	"	28	"
Otherwise	239	"	42	"
Other work	24	"	6	"
Otherwise	238	"	64	"
Primary former work				
Secondary	2	"	--	"
College Teaching	9	"	4	"
College Research	13	"	12	"
College Teaching/Research	11	"	14	"
R&D in Business	58	"	2	"
R&D in Government	5	"	2	"
Executive	5	"	1	"
Other Professional	24	"	1	"
Student	102	"	28	"
Other	19	"	3	"
NR	14	"	3	"

Response Category	Industrial Sample		Academic Sample	
	Pre-test	Post-test	Pre-test	Post-test
	N = 262	N = 233	N = 70	N = 50
How often used own collection				
Used seldom	7	3	2	--
Used occasionally	21	18	8	5
Used frequently	46	58	11	8
Used routinely	188	153	48	36
NR	--	1	1	--
How often used Search Indexes				
Never use	45	40	7	6
Used seldom	72	83	9	5
Used occasionally	66	73	18	16
Used frequently	51	16	15	8
Used routinely	27	21	19	13
NR	1	--	2	2
Standard Abstracts				
Never use	53	43	NA	NA
Used seldom	78	89	"	"
Used Occasionally	63	55	"	"
Used frequently	31	26	"	"
Used routinely	34	20	"	"
NR	3	--	"	"
In-house Abstracts				
Never use	36	27	NA	NA
Used seldom	34	46	"	"
Used occasionally	52	57	"	"
Used frequently	47	41	"	"
Used routinely	93	61	"	"
NR	--	1	"	"
How Often Used Abstracts and Contents				
Never use	NA	NA	3	2
Used seldom	"	"	10	6
Used occasionally	"	"	14	12
Used frequently	"	"	22	15
Used routinely	"	"	19	13
NR	"	"	2	2
How Often Scanned Primary Sources				
Never use	13	13	--	--
Used seldom	32	47	2	1
Used occasionally	66	63	11	9
Used frequently	63	46	18	11
Used routinely	88	63	38	28
NR	--	1	1	1

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
How often browsed Monsanto (FSU) library				
Never use	12	18	3	2
Used seldom	42	47	15	10
Used occasionally	79	78	17	13
Used frequently	60	45	20	15
Used routinely	69	44	14	9
NR	--	1	1	1
How often used Citations				
Never use	25	26	1	--
Used seldom	63	56	3	3
Used occasionally	77	76	13	7
Used frequently	51	42	24	19
Used routinely	44	30	27	19
NR	2	3	2	2
How often used Monsanto colleague				
Never use	8	6	NA	NA
Used seldom	46	57	"	"
Used occasionally	103	84	"	"
Used frequently	65	53	"	"
Used routinely	40	32	"	"
NR	--	1	"	"
How often used faculty member				
Never use	NA	NA	4	4
Used seldom	"	"	21	15
Used occasionally	"	"	25	18
Used frequently	"	"	11	5
Used routinely	"	"	8	7
NR	"	"	1	1
How often used student				
Never use	NA	NA	14	7
Used seldom	"	"	26	20
Used occasionally	"	"	19	15
Used frequently	"	"	7	4
Used routinely	"	"	3	3
NR	"	"	1	1
How often used friend outside Monsanto(FSU)				
Never use	127	109	22	15
Used seldom	86	87	26	19
Used occasionally	34	28	16	11
Used frequently	6	4	5	4
Used routinely	5	2	--	--
NR	4	3	1	1

Response Category	Industrial Sample		Academic Sample	
	Pre-test N = 262	Post-test N = 233	Pre-test N = 70	Post-test N = 50
How often used immediate supervisor				
Never use	12	14	NA	NA
Used seldom	59	56	"	"
Used occasionally	104	87	"	"
Used frequently	56	47	"	"
Used routinely	30	29	"	"
NR	1	2	"	"
How often used another supervisor				
Never use	35	--	NA	NA
Used seldom	99	1	"	"
Used occasionally	80	--	"	"
Used frequently	33	--	"	"
Used routinely	13	1	"	"
NR	2	231	"	"
How often used non-student assistant				
Never use	NA	NA	52	37
Used seldom	"	"	10	8
Used occasionally	"	"	2	1
Used frequently	"	"	2	1
Used routinely	"	"	1	1
NR	"	"	3	2
How often used Librarian				
Never use	38	36	39	27
Used seldom	109	69	22	17
Used occasionally	62	87	5	3
Used frequently	39	27	1	1
Used routinely	13	13	1	--
NR	1	1	2	2
How often used Technician				
Never use	96	71	NA	NA
Used seldom	92	86	"	"
Used occasionally	40	45	"	"
Used frequently	13	14	"	"
Used routinely	20	15	"	"
NR	1	2	"	"
How often used On-line data base (NSF service)				
Never use	202	109	52	41
Used seldom	44	59	7	2
Used occasionally	9	50	6	4
Used frequently	2	12	2	1
Used routinely	2	2	--	--
NR	3	1	3	2

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
How often used current Awareness Service				
Never use	NA	NA	60	44
Used seldom	"	"	4	2
Used occasionally	"	"	1	--
Used routinely	"	"	2	2
NR	"	"	3	2
How often used other on-line services				
Never use	56	167	14	8
Used seldom	1	45	--	--
Used occasionally	1	18	--	--
Used frequently	3	1	--	--
Used routinely	9	--	--	--
NR	192	2	56	42
How useful own collection				
Not used	3	2	--	--
Little help	8	8	3	1
Some help	76	56	16	12
Important resource	175	165	51	37
NR	--	2	--	--
How useful search indexes				
Not used	59	59	10	7
Little help	81	69	11	9
Some help	88	77	20	17
Important resource	31	25	28	16
NR	3	3	1	1
How useful standard abstracts				
Not used	67	62	NA	NA
Little help	89	72	"	"
Some help	65	73	"	"
Important resource	37	23	"	"
NR	4	3	"	"
How useful in-house abstracts				
Not used	42	38	NA	NA
Little help	60	70	"	"
Some help	103	77	"	"
Important resource	54	46	"	"
NR	3	2	"	"
How useful abstract services				
Not used	NA	NA	6	4
Little help	"	"	9	8
Some help	"	"	20	14
Important resource	"	"	34	23
NR	"	"	1	1

Response Category	Industrial Sample		Academic Sample	
	Pre-test N = 262	Post-test N = 233	Pre-test N = 70	Post-test N = 50
How useful scanning primary sources				
Not used	27	21	2	1
Little help	62	55	10	9
Some help	115	108	16	10
Important resource	57	46	42	30
NR	1	3	--	--
How useful browsing Monsanto (FSU) library				
Not used	33	26	9	7
Little help	63	76	23	18
Some help	127	92	28	20
Important resource	36	34	10	5
NR	3	5	--	--
How useful citations				
Not used	45	38	1	1
Little help	76	58	7	6
Some help	76	88	27	18
Important resource	62	44	35	25
NR	3	5	--	--
How useful Monsanto colleague				
Not used	18	11	NA	NA
Little help	62	62	"	"
Some help	116	108	"	"
Important resource	64	50	"	"
NR	2	2	"	"
How useful faculty members				
Not used	NA	NA	9	7
Little help	"	"	17	14
Some help	"	"	30	19
Important resource	"	"	14	10
NR	"	"	--	--
How useful FSU student				
Not used	NA	NA	23	16
Little help	"	"	22	15
Some help	"	"	19	14
Important resource	"	"	6	5
How useful friend outside				
Not used	146	139	36	26
Little help	63	56	16	11
Some help	42	28	14	10
Important resource	7	5	3	2
NR	4	5	1	1

Response Category	Industrial Sample		Academic Sample	
	Pre-test N = 262	Post-test N = 233	Pre-test N = 70	Post-test N = 50
How useful immediate supervisor				
Not used	17	22	NA	NA
Little help	51	55	"	"
Some help	130	99	"	"
Important resource	61	54	"	"
NR	3	3	"	"
How useful another supervisor				
Not used	63	49	NA	NA
Little help	67	77	"	"
Some help	97	75	"	"
Important resource	32	27	"	"
NR	3	5	"	"
How useful non-student assistant (FSU)				
Not used	NA	NA	60	43
Little help	"	"	5	4
Some help	"	"	2	1
Important resource	"	"	1	1
NR			2	1
How useful Librarian				
Not used	63	60	51	36
Little help	60	58	5	5
Some help	105	82	9	6
Important resource	31	32	3	2
NR	3	1	2	1
How useful technician				
Not used	114	--	NA	NA
Little help	67	--	"	"
Some help	59	--	"	"
Important resource	18	--	"	"
NR	4			
How useful on-line data				
Not used	207	111	56	43
Little help	20	34	2	1
Some help	17	48	6	3
Important resource	14	36	4	2
NR	4	4	2	1
How useful computer Current Awareness Service (FSU)				
Not used	NA	NA	61	45
Little help	"	"	2	1
Some help	"	"	1	--
Important resource	"	"	3	2
NR	"	"	3	2

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
How useful other sources				
Not used	58	42	13	8
Little help	2	1	--	--
Some help	3	4	1	--
Important resource	10	4	1	--
NR	189	182	55	42
Utility - local availability				
Essential	85	75	49	36
Very important	119	106	19	14
Some importance	47	46	2	--
Not important	10	4	--	--
NR	1	2	--	--
Utility - up-to-dateness				
Essential	98	88	47	32
Very important	131	114	20	15
Some importance	29	26	2	2
Not important	3	4	1	1
NR	1	1	--	--
Utility - response time-citation				
Essential	39	29	15	12
Very important	137	121	38	26
Some importance	75	70	14	11
Not important	9	12	2	1
NR	2	1	1	--
Utility - response time-full document				
Essential	25	17	14	12
Very important	119	108	36	23
Some importance	102	94	16	12
Not important	13	13	4	3
NR	3	1	--	--
Utility - accuracy/authority				
Essential	137	116	44	32
Very important	102	96	24	16
Some importance	19	15	2	2
Not important	2	2	--	--
NR	2	4	--	--
Utility - comprehensive/complete				
Essential	83	63	32	23
Very important	136	128	32	22
Some importance	38	36	5	4
Not important	2	2	--	--
NR	3	4	1	1

Response Category	Industrial Sample		Academic Sample	
	Pre-test N = 262	Post-test N = 233	Pre-test N = 70	Post-test N = 50
Utility-direct use				
Essential	30	18	17	15
Very important	88	66	32	20
Some importance	117	119	17	11
Not important	26	28	4	4
NR	1	2	--	--
Utility - other				
Essential	2	3	--	--
Very important	1	1	2	1
Some importance	3	--	1	1
Not important	19	12	2	1
NR	237	217	65	47
First choice to keep up new developments				
Own collection	10	--		
Search indexes	18	--		
Standard abstracts	28	--		
In-house abstracts	58	--		
Scannint primary source	88	--		
Browsing Monsanto Library	11	--		
Citation	3	--		
Monsanto collection	2	--		
Friend outside	3	--		
Immediate supervisor	2	--		
Another supervisor	1	--		
Librarian	10	--		
Technician	--	--		
On-line data base	11	--		
Other	3	--		
N/A	5	--		
NR	9	--		
Own collection			--	--
Search indexes			3	2
Abstract contents			16	11
Scan primary source			39	28
Browsing FSU Library			1	1
Citation			--	--
Faculty member			2	1
FSU student			--	--
Friend outside			--	--
Non-student assistant			--	--
Librarian			--	--
On-line data base			1	1
Current awareness service			3	3
Other			1	--
N/A			1	--
NR			3	3

Response Category	Industrial Sample		Academic Sample	
	Pre-test	Post-test	Pre-test	Post-test
First choice to find what is in literature	N = 262	N = 233	N = 70	N = 50
Own collection	5			
Search indexes	41			
Standard abstracts	64			
In-house abstracts	22			
Scan primary sources	37			
Browsing Monsanto Library	7			
Citation	1			
Monsanto colleague	--			
Friend outside	1			
Immediate supervisor	1			
Another supervisor	--			
Librarian	28			
Technician	--			
On-line data base	33			
Other	3			
N/A	8			
NR	11			
First choice to find what is in literature				
Own collection			--	--
Search indexes			15	10
Abstract contents			33	24
Scan primary sources			9	5
Browsing FSU Library			1	1
Citations			1	1
Faculty member			--	--
FSU student			--	--
Friend outside			--	--
Non-student asst.			--	--
Librarian			--	--
On-line data base			6	6
Current Awareness service			1	--
Other			1	1
NR			3	2
First choice to brush up				
Own collection	40			
Search indexes	27			
Standard abstracts	30			
In-house abstracts	8			
Scan primary sources	49			
Browsing Monsanto Library	53			
Citation	2			
Monsanto colleague	6			
Friend outside	--			
Immediate supervisor	2			

(Continued)

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Another supervisor	--			
Librarian	13			
Technician	--			
On-line data base	12			
N/A	4			
NR	12			
Other	4			
First choice to brush up on topic				
Own collection			17	9
Search indexes			6	4
Abstract contents			16	12
Scan primary sources			7	7
Browsing FSU Library			4	4
Citations			4	3
Faculty member			3	3
FSU student			--	--
Friend outside			--	--
Non-student assistant			--	--
Librarian			--	--
On-line data base			5	4
Current Awareness Service			1	--
Other			3	2
NR			4	2
First choice to look up specific facts for project				
Own collection	49			
Search indexes	17			
Standard Abstract	19			
In-house abstract	24			
Scan primary sources	13			
Browsing Monsanto Library	13			
Citation	3			
Monsanto colleague	31			
Friend outside	2			
Immediate supervisor	15			
Another supervisor	4			
Librarian	28			
Technician	--			
On-line data base	15			
Other	6			
N/A	7			
NR	16			

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
First choice to look up specific facts for project				
Own collection			8	6
Search indexes			5	3
Abstract contents			20	14
Scan primary sources			19	14
Browsing FSU Library			2	1
Citations			4	3
Faculty member			1	--
FSU student			--	--
Friend outside			--	--
Non-student assistant			--	--
Librarian			--	--
On-line data base			3	3
Current Awareness Service			1	1
Other			1	1
NR			6	--
First choice for descriptions of procedures				
Own collection	37			
Search indexes	13			
Standard abstract	20			
In-house abstract	25			
Scan primary sources	9			
Browsing Monsanto Library	17			
Citation	2			
Monsanto colleague	36			
Friend outside	2			
Immediate supervisor	19			
Another supervisor	6			
Librarian	21			
Technician	2			
On-line data base	14			
Other	7			
N/A	16			
NR	16			
First choice for Descriptions of procedures				
Own collection			11	9
Search indexes			2	1
Abstract contents			16	10
Scan primary sources			18	13
Browsing FSU Library			2	2
Citations			7	5
Faculty member			4	3
FSU student			--	--

(Continued)

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Friend outside			--	--
Non-student assistant			--	--
Librarian			--	--
On-line data base			2	2
Current Awareness Service			1	--
Other			2	1
N/A			1	--
NR			4	4
First choice to prepare for meeting in company				
Own collection	158		NA	NA
Search indexes	3		"	"
Standard abstract	2		"	"
In-house abstract	12		"	"
Scan primary source	5		"	"
Browsing Monsanto Library	8		"	"
Citation	--		"	"
Monsanto colleague	6		"	"
Friend outside	1		"	"
Immediate supervisor	14		"	"
Another supervisor	--		"	"
Librarian	10		"	"
Technician	--		"	"
On-line data base	3		"	"
Other	3		"	"
N/A	23		"	"
NR	14		"	"
First choice for Internal report				
Own collection	172		NA	NA
Search indexes	6		"	"
Standard abstract	5		"	"
In-house abstract	12		"	"
Scan primary sources	6		"	"
Browsing Monsanto Library	4		"	"
Citation	1		"	"
Monsanto colleague	2		"	"
Friend outside	1		"	"
Immediate supervisor	6		"	"
Another supervisor	--		"	"
Librarian	10		"	"
Technician	1		"	"
On-line data base	4		"	"
Other	3		"	"
N/A	14		"	"
NR	15		"	"

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
First choice to prepare for teaching				
Own Collection	NA	NA	27	20
Search indexes	"	"	1	--
Abstract contents	"	"	2	1
Scan primary sources	"	"	5	5
Browsing FSU Library	"	"	6	5
Citation	"	"	3	2
Faculty member	"	"	2	2
FSU student	"	"	--	--
Friend outside	"	"	--	--
Non-student-assistant	"	"	--	--
Librarian	"	"	--	--
On-line data base	"	"	1	1
Current Awareness Service	"	"	--	--
Other	"	"	2	1
N/A	"	"	17	--
NR	"	"	4	13
First choice to prepare grant proposals (FSU)				
Own collection	NA	NA	12	8
Search indexes	"	"	5	3
Abstract contents	"	"	9	5
Scan primary sources	"	"	9	8
Browsing FSU Library	"	"	1	--
Citations	"	"	1	1
Faculty member	"	"	--	--
FSU student	"	"	--	--
Friend outside	"	"	--	--
Non-student assistant	"	"	--	--
Librarian	"	"	--	--
On-line data base	"	"	4	4
Current Awareness Service	"	"	1	1
Other	"	"	--	--
N/A	"	"	22	--
NR	"	"	6	20
First choice to prepare external paper				
Own collection	74			
Search indexes	11			
Standard abstract	19			
In-house abstract	1			
Scan primary sources	16			
Browsing Monsanto Library	7			
Citation	3			

(continued)

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Monsanto colleague	1			
Friend outside	--			
Immediate supervisor	4			
Another supervisor	--			
Librarian	12			
Technician	--			
On-line data base	15			
Other	2			
N/A	80			
NR	17			
First choice to prepare external paper				
Own Collection			14	9
Search indexes			5	3
Abstract contents			15	11
Scan primary sources			16	13
Browsing FSU Library			2	1
Citations			2	1
Faculty member			--	--
FSU student			--	--
Friend outside			--	--
Non-student assistant			1	1
Librarian			--	--
On-line data base			2	2
Current Awareness Service			1	--
N/A			6	--
NR			6	9
First choice to prepare patent application				
Own collection	99			
Search indexes	6			
Standard abstracts	15			
In-house abstract	7			
Scan primary sources	6			
Browsing Monsanto Library	2			
Citation	2			
Monsanto colleague	5			
Friend outside	--			
Immediate supervisor	5			
Another supervisor	--			
Librarian	30			
Technician	--			
On-line data base	13			
Other	1			
N/A	55			
NR	16			

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
First choice to prepare patent application				
Own collection			4	1
Search indexes			1	--
Abstract contents			4	3
Scan primary sources			--	--
Browsing FSU Library			1	--
Citation			--	--
Faculty member			--	--
FSU student			--	--
Friend outside			--	--
Non-student assistant			--	--
Librarian			--	--
On-line data base			2	2
Current Awareness Service			1	1
N/A			46	--
NR			11	43
First choice to prepare literature review				
Own collection	9			
Search indexes	27			
Standard abstract	44			
In-house abstract	10			
Scan primary sources	12			
Browsing Monsanto library	9			
Citation	2			
Monsanto colleague	--			
Friend outside	--			
Immediate supervisor	--			
Another supervisor	--			
Librarian	37			
Technician	--			
On-line data base	45			
Other	1			
N/A	51			
NR	15			
First choice to prepare literature review				
Own collection			5	2
Search indexes			8	6
Abstract contents			23	19
Scan primary sources			3	2
Browsing FSU Library			2	--
Citation			1	1
Faculty member			--	--
FSU student			--	--

(continue)

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Friend outside			--	--
Non-student assistant			--	--
Librarian			--	--
On-line data base			7	6
Current Awareness Service			2	1
Other			1	--
N/A			10	--
NR			8	13
First choice of all sources				
Own collection	116			
Search indexes	12			
Standard abstract	25			
In-house abstract	14			
Scan primary sources	22			
Browning Monsanto Library	5			
Citation	1			
Monsanto colleague	4			
Friend outside	1			
Immediate supervisor	4			
Another supervisor	--			
Librarian	21			
Technician	--			
On-line data base	30			
Other	--			
NR	7			
First choice of all sources				
Own collection			7	6
Search indexes			6	3
Abstract contents			22	16
Scan primary sources			19	13
Browsing FSU Library			1	1
Citations			2	1
Faculty member			2	1
FSU student			--	--
Friend outside			--	--
Non-student assistant			--	--
Librarian			--	--
On-line data base			4	3
Current Awareness Service			5	4
Other			1	1
NR			1	--

Resource Category	Industrial Sample		Academic Sample	
	Pre-test N = 262	Post-test N = 233	Pre-test N = 70	Post-test N = 50
Librarian	24			
Technician	1			
On-line data base	14			
Other	4			
NR	12			
Third choice of all sources				
Own collection			14	9
Search indexes			11	8
Abstract contents			10	8
Scan primary sources			13	10
Browsing FSU Library			7	3
Citations			2	2
Faculty member			7	4
FSU student			--	--
Friend outside			--	--
Non-student assistant			--	--
Librarian			--	--
On-line data base			2	2
Current Awareness Service			1	1
Other			--	--
NR			3	3
Last choice or least desirable sources				
Own collection	9			
Search indexes	17			
Standard abstract	22			
In-house abstract	10			
Scan primary sources	22			
Browsing Monsanto library	21			
Citation	4			
Monsanto colleague	14			
Friend outside	29			
Immediate supervisor	5			
Another supervisor	8			
Librarian	17			
Technician	40			
On-line data base	15			
Other	2			
NR	27			
Least desirable sources				
Own collection			--	--
Search indexes			--	--
Abstract contents			--	--
Scan primary source			--	--

(Continued)

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Second choice of all sources				
Own collection	27			
Search indexes	24			
Standard abstract	34			
In-house abstract	29			
Browsing library	19			
Scan primary sources	40			
Citation	5			
Friend outside	--			
Immediate supervisor	9			
Another supervisor	--			
Librarian	17			
Technician	1			
On-line data base	24			
Other	7			
NR	7			
Monsanto colleague	19			
Second choice of all sources				
Own collection			10	8
Search indexes			9	8
Abstract contents			16	12
Scan primary sources			18	13
Browsing FSU Library			2	--
Citations			3	2
Faculty member			1	1
FSU student			--	--
Friend outside			--	--
Non-student assistant			--	--
Librarian			--	--
On-line data base			8	4
Current Awareness Service			1	--
Other			--	--
NR			2	2
Third choice of all sources				
Own collection	22			
Search indexes	21			
Standard abstract	24			
In-house abstract	41			
Scan primary sources	30			
Browsing Monsanto library	22			
Citation	7			
Monsanto colleague	20			
Friend outside	3			
Immediate supervisor	14			
Another supervisor	3			

(continued)

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Pro-test N = 50
~~Browsing FSU library~~			4	3
Citation			1	--
Faculty member			1	1
FSU student			5	3
Friend outside			4	4
Non-student assistant			31	23
Librarian			12	8
On-line data base			1	1
Current Awareness Service			3	1
Other			--	--
NR			8	6
Informal discussion				
Substantially more	14		13	8
Somewhat more	80		24	20
About right	161		32	22
Somewhat less	3		1	--
Substantially less	--		--	--
NR	4		--	--
Access to public information				
Substantially more	41		30	22
Somewhat more	111		29	21
About right	107		11	7
Somewhat less	--		--	--
Substantially less	--		--	--
NR	3		--	--
Access to in-house reports				
Substantially more	23		6	6
Somewhat more	74		14	11
About right	159		37	25
Somewhat less	3		2	--
Substantially less	--		5	3
NR	3		6	5
Advantageous to do own information search				
Strongly agree	52	35	39	18
Agree somewhat	171	131	26	27
Disagree somewhat	27	57	4	2
Strongly disagree	6	3	1	1
NR	6	7	--	2
Present information locating means adequate				
Strongly agree	17	49	4	8
Agree sinewgat	147	138	38	31
Disagree somewhat	79	34	26	8
Strongly disagree	14	5	2	2
NR	5	7	--	

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70*	Academic Sample Post-test N = 50
Librarian useful				
Strongly agree	128	150	19	22
Agree somewhat	114	75	38	18
Disagree somewhat	12	3	12	7
Strongly disagree	1	1	1	2
NR	7	4	--	1
Forefront of knowledge				
Strongly agree	34		31	
Agree somewhat	114		31	
Disagree somewhat	80		5	
Strongly disagree	24		--	
NR	10		3	
Present sources adequate				
Strongly agree	53		14	
Agree somewhat	157		40	
Disagree somewhat	41		14	
Strongly disagree	7		2	
NR	4		--	
Present sources time-consuming				
Strongly agree	10		6	
Agree somewhat	75		29	
Disagree somewhat	140		28	
Strongly disagree	24		3	
NR	13		4	
Present sources up-to-date				
Strongly agree	40		10	
Agree somewhat	172		43	
Disagree somewhat	29		15	
Strongly disagree	9		1	
NR	12		1	
Used on line				
Yes	31		17	10
No	228		53	40
NR	3		--	--
If no, familiar				
Yes	83		27	17
No	153		27	23
NR	26		16	--
On-line an improved method				
Yes	104		41	27
No	14		1	1
Don't know	141		27	21
NR	3		1	1

Response Category	Industrial Sample Pre-test N = 262	Industrial Sample Post-test N = 233	Academic Sample Pre-test N = 70	Academic Sample Post-test N = 50
Potential utility of on-line searching (open ended)				
Don't know (need more information, wait to see, need to use)	14		4	
Would like to try it	1		4	
Positive expectations/useful	114		27	
Negative expectations/not useful	8		1	
Good service but not useful for my work	8		1	
Good service, don't know if useful for my work	10		--	
Useful with reservations	26		12	
All other comments	5		--	
NR	76		21	
Monsanto Facility (MTC)				
Pensacola	171			
Blacksburg, South Carolina	1			
Decatur, Alabama	34			
Durham, North Carolina (Research Triangle, Triangle Park, MTPDC, MTPDCI, dtd.)	44			
Greenwood, South Carolina	5			
Sand Mountain, Alabama	1			
Other	1			
NR	2			

	Post-test MTC	Post-test FSU
Online adequacy - Literature coverage		
Subjects included:		
Very good	45	28
Good	105	14
Fair	30	2
Poor	3	1
Very poor	4	--
NR	46	5
Specific titles:		
Very good	48	25
Good	108	17
Fair	26	3
Poor	2	--
Very poor	2	--
NR	47	5
Up-to-dateness of literature:		
Very good	54	24
Good	102	17
Fair	28	4
Poor	1	--
Very poor	1	--
NR	47	5
Retrospective searching:		
Very good	13	1
Good	68	14
Fair	63	21
Poor	34	5
Very poor	9	4
NR	46	5
Online adequacy - interaction with system		
Service hours:		
Very good	68	18
Good	100	19
Fair	19	5
Poor	1	2
Very poor	1	--
NR	50	6
Performance of searches by specialists:		
Very good	91	32
Good	76	8
Fair	14	4
Poor	--	--
Very poor	1	--
NR	51	6

	Post-test MTC	Post-test FSU
Information provided about system:		
Very good	63	27
Good	87	12
Fair	31	3
Poor	2	2
Very poor	1	--
NR	49	6
Subject access (keywords, descriptions):		
Very good	26	12
Good	108	18
Fair	40	12
Poor	4	1
Very poor	2	1
NR	53	6
Other access points:		
Very good	18	16
Good	101	19
Fair	50	6
Poor	3	2
Very poor	1	--
NR	60	7
Ease of use:		
Very good	42	24
Good	94	12
Fair	40	6
Poor	3	--
Very poor	1	--
NR	53	8
<u>Online adequacy - Search results</u>		
Time to obtain results online:		
Very good	72	39
Good	79	3
Fair	24	1
Poor	--	--
Very poor	2	--
NR	56	7
Time to obtain results offline:		
Very good	37	18
Good	90	19
Fair	41	3
Poor	4	--
Very poor	2	--
NR	59	10

	Post-test MTC	Post-test FSU
Completeness of search results:		
Very good	23	13
Good	104	21
Fair	47	7
Poor	1	1
Very poor	4	1
NR	54	7
Exclusion of non-relevant citations:		
Very good	9	1
Good	58	18
Fair	95	18
Poor	14	5
Very poor	3	1
NR	54	7
Full-text availability in personal collection:		
Very good	14	1
Good	78	18
Fair	57	14
Poor	18	8
Very poor	8	1
NR	58	8
Full-text availability in library:		
Very good	10	6
Good	92	18
Fair	62	15
Poor	11	2
Very poor	3	2
NR	55	7
Full-test availability by inter-library loan:		
Very good	52	11
Good	79	16
Fair	35	7
Poor	2	3
Very poor	2	--
NR	63	13
<u>Utility of online bibliographic services</u>		
To keep up with new developments:		
Best method available	25	7
Very useful	110	24
Somewhat useful	64	15
Not useful	10	1
NR	24	3

	Post-test MTC	Post-test FSU
To find what is reported on a topic:		
Best method available	51	16
Very useful	113	26
Somewhat useful	43	4
Not useful	3	1
NR	23	3
To brush up on a topic:		
Best method available	28	10
Very useful	110	22
Somewhat useful	60	14
Not useful	11	1
NR	24	3
To look for specific facts:		
Best method available	26	10
Very useful	101	16
Somewhat useful	73	18
Not useful	11	2
NR	22	4
To find descriptions of procedures:		
Best method available	20	5
Very useful	71	17
Somewhat useful	98	21
Not useful	18	3
NR	26	4
To prepare for meeting in company:		
Best method available	6	NA
Very useful	38	
Somewhat useful	121	
Not useful	45	
NR	23	
To prepare for teaching:		
Best method available	NA	--
Very useful		4
Somewhat useful		19
Not useful		17
NR		10
to prepare internal report:		
Best method available	7	NA
Very useful	58	
Somewhat useful	123	
Not useful	21	
NR	24	

	Post-test MTC	Post-test FSU
To prepare grant proposal:		
Best method available	NA	4
Very useful		24
Somewhat useful		13
Not useful		3
NR		6
To prepare external paper:		
Best method available	21	4
Very useful	110	28
Somewhat useful	58	12
Not useful	21	2
NR	23	4
To prepare patent application:		
Best method available	20	1
Very useful	106	10
Somewhat useful	70	12
Not useful	14	10
NR	23	17
To prepare literature review:		
Best available	67	18
Very useful	112	23
Somewhat useful	25	4
Not useful	5	--
NR	24	5
Finding citations easy without online:		
Strongly agree	6	3
Agree somewhat	67	11
Disagree somewhat	109	27
Strongly disagree	25	6
NR	26	3
Finding citations easy with online:		
Strongly agree	54	21
Agree somewhat	125	22
Disagree somewhat	23	4
Strongly disagree	4	--
NR	27	3
Prefer to delegate literature searches:		
Strongly agree	38	1
Agree somewhat	90	12
Disagree somewhat	75	21
Strongly disagree	25	15
NR	5	1

	Post-test MTC	Post-test FSU
Online searches allow more reading time:		
Strongly agree	67	16
Agree somewhat	122	26
Disagree somewhat	28	5
Strongly disagree	3	1
NR	13	2
Online searches allow less time for searching literature:		
Strongly agree	74	21
Agree somewhat	93	14
Disagree somewhat	36	9
Strongly disagree	17	5
NR	13	1
Online reliance gives misses citation:		
Strongly agree	36	13
Agree somewhat	121	21
Disagree somewhat	56	12
Strongly disagree	5	2
NR	15	2
Delegate formulation of online search strategies:		
Strongly agree	38	2
Agree somewhat	99	15
Disagree somewhat	64	19
Strongly disagree	18	12
NR	14	2
Should manually double-check online results:		
Strongly agree	8	3
Agree somewhat	81	13
Disagree somewhat	94	23
Strongly disagree	27	8
NR	23	3
Online searches increase productivity:		
Strongly agree	43	15
Agree somewhat	141	27
Disagree somewhat	27	6
Strongly disagree	4	1
NR	18	1

	Post-test MTC	Post-test FSU
Online searches too time consuming:		
Strongly agree	--	--
Agree somewhat	17	5
Disagree somewhat	120	20
Strongly disagree	75	24
NR	21	1
Too many useless foreign articles:		
Strongly agree	13	2
Agree somewhat	78	16
Disagree somewhat	79	16
Strongly disagree	37	14
NR	26	2
Prefer to do own online searching:		
Strongly agree	10	2
Agree somewhat	42	11
Disagree somewhat	104	21
Strongly disagree	58	14
NR	19	2
Company funds should pay for online:		
Strongly agree	90	--
Agree somewhat	87	--
Disagree somewhat	25	--
Strongly disagree	13	--
NR	18	--
Own cost-center should pay:		
Strongly agree	106	--
Agree somewhat	79	--
Disagree somewhat	23	--
Strongly disagree	9	--
NR	16	--
Department funds should pay:		
Strongly agree	--	12
Agree somewhat	--	16
Disagree somewhat	--	16
Strongly disagree	--	3
NR	--	3
Grant/contract funds to pay:		
Strongly agree	--	12
Agree somewhat	--	21
Disagree somewhat	--	10
Strongly disagree	--	2
NR	--	5

	Post-test MTC	Post-test FSU
Willing to pay out of pocket:		
Strongly agree	--	--
Agree somewhat	--	12
Disagree somewhat	--	11
Strongly disagree	--	24
NR	--	3
How many papers, reports prepared:		
0	105	8
1	25	7
2-3	51	17
4-5	28	7
6-10	6	7
11-20	3	2
NR	15	2
How many grant/contract proposals:		
0	192	27
1	5	8
2-3	11	10
4-5	1	2
6 +	3	--
NR	21	3
Preparation of non-published reports:		
0	71	29
1	24	9
2-3	47	3
4-5	24	2
6-10	26	2
11 +	10	1
NR	31	4
Course preparation:		
0	--	33
1	--	10
2-3	--	5
NR	--	2
Number of papers, reports requiring literature search:		
0	98	6
1	27	8
2-3	39	19
4-5	12	4
6-10	1	7
NR	56	6

	Post-test MTC	Post-test FSU
Number of papers, reports that used online searches:		
0	139	12
1	19	8
2-3	14	19
4-5	1	4
6-10	--	1
NR	60	6
Number of grant/contract proposals requiring literature searches:		
0	130	21
1	9	7
2-3	3	7
4-5	--	2
NR	91	13
Number of proposals that used online searches:		
0	136	27
1	5	6
2-3	1	2
4-5	--	1
NR	91	14
Number of technical reports requiring literature searches:		
0	92	26
1	30	8
2-3	43	2
4-5	14	1
6-10	7	2
11 +	--	1
NR	47	10
Number of technical reports using online searches		
0	121	32
1	38	5
2-3	19	1
4-5	2	1
6-10	--	1
NR	53	10
Number of other activities requiring literature searches:		
0	20	6
1	17	5
2-3	22	5
4-5	4	3
6-10	5	1
11 +	--	2
NR	165	28

	Post-test MTC	Post-test FSU
Number of other activities using online searches:		
0	30	7
1	18	4
2-3	18	6
4-5	5	3
6-10	1	1
NR	161	29
Number of course preparations using online searches:		
0	--	33
1	--	1
2-3	--	1
NR	--	15
<u>Comments -- Advantages of Online</u>		
Utility	44	16
Completeness exhaustiveness	19	4
Good for keeping current	9	5
Convenience	9	7
Broad coverage of sources	9	1
Increases productivity	4	3
Very useful - works well	25	17
Rapid response time	35	8
Very up-to-date	4	3
<u>Comments -- Disadvantages of Online</u>		
Difficult to choose key words	12	5
Key words miss some references	7	3
Key words get many irrelevant references	17	1
Coverage not broad enough	10	4
Can't search formulas	2	1
Time delay between publication and entry	3	1

Dear Colleague,

This is to introduce you to an FSU Study with the participation of the FSU Chemistry Department, supported by the National Science Foundation, which is intended to assess the effect of on-line computer searched bibliographic data bases on the information style of chemists. Portions of Chemical Abstracts and other indexes such as the Smithsonian Science Information Exchange (SSIE) and the American Geological Institute (GEOREF) can now be searched at computer terminals by author, subject, and other access points. Within a matter of minutes, citations of potentially relevant documents are printed at the terminal.

We are interested in learning whether the availability of such a search service in the Chemistry Building will assist you in selecting information for your professional tasks. Plans are to install a computer terminal in mid-May. We will provide free computer searches, at first performed by information specialists and then conducted on a self-service basis.

We need to learn about the way you seek scientific information before introducing the computer terminal and at the conclusion of the study, which will last at least until the end of 1976. We would like to obtain the needed information with the aid of the attached questionnaire and short interviews. Whether or not you now plan to use the computer search service, please fill out the attached questionnaire and return it by April 21st in the enclosed envelope to Gery Jahoda, Room 35 Strozier Library.

We are looking forward to working with you and appreciate your help in filling out the questionnaire. Please call Gery Jahoda (4-2242) or Al Bayer (4-2833) if you have any questions about the study or the questionnaire.

Sincerely,

Al

Al Bayer
Institute of Social Research

Gery

Gery Jahoda
School of Library Science

SURVEY OF THE INFORMATION STYLE OF FLORIDA STATE UNIVERSITY CHEMISTS

1. Your name:______________________________

2. Your sex: Male__________ Female__________

3. What is the <u>highest</u> <u>level</u> of formal education you have attained? (Circle appropriate letter).

   A. BA, BS

   B. MA, MS

   C. Doctorate without dissertation

   D. Ph.D.

   E. Other doctorate

   F. Other (please specify:______________________________)

4. What is the major field of highest degree you now hold?____________________

5. Year in which highest presently held degree was obtained: 19____

6. Calendar year from which you have been continuously in association with FSU (including leaves of absence): 19____

7. Which best describes your present position at FSU (please circle one):

   A. Full Professor

   B. Associate Professor

   C. Assistant Professor

   D. Instructor/Lecturer

   E. Postdoctoral Fellow

   F. Doctoral Candidate or Doctoral Student

   G. Research Associate

   H. Other (please specify:______________________________)

8. Based on an average week, how many hours, on the average, do you actually spend in each of the following activities related to your position at FSU, including time spent after regular working hours, if applicable? (Circle one number for each listed activity).

	None	1-4 hrs.	5-8 hrs.	9-12 hrs.	13-16 hrs.	17-20 hrs.	21-24 hrs.	25-28 hrs.	29-32 hrs.	33 or more
A. Administration	1	2	3	4	5	6	7	8	9	10
B. Locating information	1	2	3	4	5	6	7	8	9	10
C. Reading professional literature	1	2	3	4	5	6	7	8	9	10
D. Laboratory research, data analysis and computer processing	1	2	3	4	5	6	7	8	9	10
E. Writing or preparing research reports or professional papers	1	2	3	4	5	6	7	8	9	10
F. Institutional or departmental meetings	1	2	3	4	5	6	7	8	9	10
G. Informal discussions with colleagues	1	2	3	4	5	6	7	8	9	10
H. Teaching (including preparation, lecturing and testing/grading)	1	2	3	4	5	6	7	8	9	10
I. Advising and counseling students (including individual student's committees)	1	2	3	4	5	6	7	8	9	10
J. Attending class as a student and related studying activities	1	2	3	4	5	6	7	8	9	10
K. Other (please specify:___________)	1	2	3	4	5	6	7	8	9	10

9. A. Mark all types of work that you have engaged in for a year or more since earning your highest degree (do not include part-time work while in graduate school).

B. Mark the one type of primary work you were engaged in immediately prior to coming to Florida State University?

	A All types of work (check all that apply)	B Primary work before coming to FSU (check one)
a. Teaching or administration in an elementary or secondary school.	______	______
b. Full-time teaching in a college or university.	______	______
c. Full-time research in a college or university.	______	______
d. Teaching and research in a college or university.	______	______
e. Research and development in business or industry.	______	______
f. Research and development in a governmental agency.	______	______
g. Executive or administrative position outside education.	______	______
h. Other professional position (please specify:______)	______	______
i. Student.	______	______
j. Other (please specify:______)	______	______

10. Indicate how frequently you used each of the sources on the list of sources of information during the last year. Please circle the appropriate response for each listed source.

	Never used - N	Used seldom (1 or 2 times) - S	Used occasionally (3-5 times) - O	Used frequently (6-8 times) - F	Used rountinely (9 or more times) - R
A. Your own collection of information, i.e., your personal files.	N	S	O	F	R
B. Your own search through indexes to the literature, e.g., Chemical Titles.	N	S	O	F	R
C. Your own scanning of abstract bulletins or table of contents services, e.g., Chemical Abstracts, Current Contents.	N	S	O	F	R
D. Your own scanning of primary journals or other primary sources.	N	S	O	F	R
E. Your own browsing in the FSU Strozier Library.	N	S	O	F	R
F. Your selection of a publication from a citation in another publication.	N	S	O	F	R
G. From a faculty member at FSU.	N	S	O	F	R
H. From a student at FSU.	N	S	O	F	R
I. From a colleague or friend outside of FSU.	N	S	O	F	R
J. From a non-student technician/laboratory assistant.	N	S	O	F	R
K. From an FSU Strozier librarian.	N	S	O	F	R
L. From an on-line searched bibliographic data base.	N	S	O	F	R
M. From a commercially computer searched current awareness service, e.g., I.S.I. machine searched current awareness.	N	S	O	F	R
N. Other (please specify:________________)	N	S	O	F	R

11. Indicate how useful each of the sources on the list below was for meeting the requirement of the project(s) in which you were engaged during the past year. Please circle appropriate response for each listed source.

	Did not use - 1	Used but of little help - 2	Used and of some help - 3	Important resource for project(s) - 4
A. Your own collection of information, i.e., your personal files.	1	2	3	4
B. Your own search through indexes to the literature, e.g., Chemical Titles.	1	2	3	4
C. Your own scanning of abstract bulletins or table of contents services, e.g., Chemical Abstracts, Current Contents.	1	2	3	4
D. Your own scanning of primary journals or other primary sources.	1	2	3	4
E. Your own browsing in the FSU Strozier Library.	1	2	3	4
F. Your selection of a publication from a citation in another publication.	1	2	3	4
G. From a faculty member at FSU.	1	2	3	4
H. From a student at FSU.	1	2	3	4
I. From a colleague or friend outside of FSU.	1	2	3	4
J. From a non-student technician/laboratory assistant.	1	2	3	4
K. From an FSU Strozier librarian.	1	2	3	4
L. From an on-line searched bibliographic data base.	1	2	3	4
M. From a commercially computer searched current awareness service, e.g., I.S.I. machine searched current awareness.	1	2	3	4
N. Other (please specify:_______________)	1	2	3	4

12. Evaluate the utility of information sources in terms of your information needs and preferences. (Indicate the importance you assign to each of the listed factors).

	Essential	Very Important	Some Importance	Not Important
A. Local availability.	E	V	S	N
B. Up-to-dateness.	E	V	S	N
C. Response time in obtaining citation/abstract.	E	V	S	N
D. Response time in obtaining full copy of original document.	E	V	S	N
E. Accuracy/Authoritativeness	E	V	S	N
F. Comprehensiveness/Completeness	E	V	S	N
G. Direct useability without librarian assistance.	E	V	S	N
H. Other (please specify:_________)	E	V	S	N

13. For these activities listed below in which you occasionally engaged, if only one information source could be used, which would you choose? (Indicate by placing the letter standing for the information source, listed in question 11. Report an N/A if the activity is not applicable to your work in the past year).

a. To keep up with new developments on a topic_______________.

b. To find out what is reported in the literature on a topic_______________.

c. To brush up on a topic_______________.

d. To look for specific facts related to on-going project_______________.

e. To look for descriptions of procedures related to an on-going project_______________.

f. To prepare for teaching_______________.

g. To prepare grant proposals or grant reports_______________.

h. To prepare a paper for external presentation or publication_______________.

i. To prepare a patent application_______________.

j. To prepare a review of the literature_______________.

14. A. If you were limited to the use of only some information sources on the list of question 11, which ones would you choose? Mark answer by placing the letter standing for the information source that would be your first choice, your second choice, and your third choice.

First choice:_______________

Second choice:_______________

Third choice:_______________

B. Of all the information sources on the list in question 11, which one would you choose last?

Least desirable:_______________

15. Evaluate the following possible changes in your work setting with respect to their potential for improving your work as a scientist. Indicate your evaluation of whether more or less would be beneficial for each item by circling the appropriate letter.

	Substantially more - A	Somewhat more - B	About right - C	Somewhat less - D	Substantially less - E
A. Informal discussion with colleagues	A	B	C	D	E
B. Access to published information	A	B	C	D	E
C. Access to FSU scientific research reports	A	B	C	D	E

16. Indicate your attitude concerning each of the following statements by circling one of the following categories: Strongly agree (SA), Agree somewhat (AS), Disagree somewhat (DS), and Strongly disagree (SD).

A. It is advantageous for a scientist to perform his/her own information search.	SA	AS	DS	SD
B. My present means of locating scientific information are adequate.	SA	AS	DS	SD
C. A Chemistry Department librarian or information specialist would serve a useful function.	SA	AS	DS	SD
D. Research done here is at the forefront of knowledge in my field.	SA	AS	DS	SD
E. Source materials (published or unpublished literature) and reference books available to me are:				
a) generally adequate for my needs	SA	AS	DS	SD
b) too time-consuming to locate	SA	AS	DS	SD
c) kept up to date	SA	AS	DS	SD

17. An on-line searched bibliographic service allows scientists to quickly search the literature pertaining to a particular information need. By typing in index terms on a computer terminal, a researcher can obtain a list of potentially relevant document citations within a matter of minutes.

A. Have you ever used an on-line search system? Yes_______ No_______

B. If not, are you familiar with the functions of such a system?

Yes_______ No_______

C. Would an on-line searched bibliographic service significantly improve your current method of doing an information search?

Yes_______ No_______ Don't know_______

D. Please comment on the potential utility of an on-line search system for your work and for the Florida State University Chemistry Department needs in general.

18. Year of your birth: 19____

19. What is today's date on which you completed this questionnaire

____/____/____
mo. day year

20. If you have any comments about this questionnaire, or if you wish to clarify any of your preceding responses, please do so below.

SURVEY OF THE INFORMATION STYLE OF MONSANTO SCIENTIFIC AND TECHNICAL PERSONNEL

On-line searched bibliographic services are now available to a portion of the science and technology literature. The individual researcher who has access to such service may now state his search requests as keywords, and/or author names, and/or other access points that are keyed in at a computer terminal. Results of such search requests, citations of potentially relevant documents, are printed out at the computer terminal in a matter of minutes when the number of potentially relevant documents is about twenty or less. Longer bibliographies are mailed promptly by System Development Corporation, the supplier of this service. The rapid turn-around time makes reformulation of searches possible when initial search results are unsatisfactory. This service, and a list of available on-line searched bibliographic data, will be made available to you.

The potential benefits of such services of faster and more convenient searches are apparent, but a more basic question remains to be answered: what is the effect of on-line searched bibliographic services on your information style--the way you seek and use information? This is basically the question that we will attempt to answer in the National Science Foundation-sponsored study at Florida State University and Monsanto.

The project will be conducted in three phases:

1. Collection of background information, present work roles, and information style prior to the introduction of on-line searched bibliographic systems, to be determined with the aid of this questionnaire.

2. Provision of on-line searched bibliographic services and analysis of the extent and types of use of this service.

3. Assessment of information style after sustained availability of on-line bibliographic search service, again with the aid of questionnaires and interviews.

The immediate benefits for participation in the study are free literature searches. We hope to gain a better understanding of the effect of the use of on-line bibliographic searched services, such that the producers of bibliographic data bases as well as the managers of information services may provide improved information services to you.

We have a considerable amount of computer time to provide information service to you in the course of the study and have at the same time attempted to keep your project connected efforts to a minimum. We hope that you will agree to participate in this study and will be able to provide the information requested below. You will not be individually identified in any reports which result from this study, and your responses will be held in confidence. Your individual code number is requested only in order that we may later followup for your assessment of the bibliographic service after you have had the opportunity to familiarize yourself with it and employ it as may be appropriate in your work.

1. Your Monsanto survey code number: ____________

2. Your sex: Male ______ Female ______

3. What is the highest level of formal education you have attained? (Circle appropriate letter.)

   A. Less than college

   B. BA, BS (field of degree ______________________________)

   C. MA, MS (field of degree ______________________________)

   D. Doctorate without dissertation (field of degree ____________)

   E. Ph.D. (field of degree ______________________________)

   F. Other doctorate (field of degree ____________________)

   G. Other (specify ______________________________________)

4. Year in which highest degree obtained: 19___

5. Calendar year from which you have had continuous service (including leaves of absence) in a professional position at Monsanto: 19___

6. What is your primary job designation in your present position at Monsanto? (Circle appropriate letter.)

   A. Bench chemist

   B. Group leader

   C. Manager

   D. Scientist

   E. Other (please specify: ______________________________)

7. Describe the primary responsibilities and work in which you are engaged.

____

____

____

____

____

8. Based on an average week, how many hours, on the average, do you actually spend in each of the following activities related to your position at Monsanto, including time spent after regular working hours, if applicable? (Circle one number for each listed activity.)

	None	1-4 hrs.	5-8 hrs.	9-12 hrs.	13-16 hrs.	17-20 hrs.	21-24 hrs.	25-28 hrs.	29-32 hrs.	33 or more
A. Administration	1	2	3	4	5	6	7	8	9	10
B. Work in a laboratory	1	2	3	4	5	6	7	8	9	10
C. Writing or preparing research reports	1	2	3	4	5	6	7	8	9	10
D. Writing or preparing professional papers	1	2	3	4	5	6	7	8	9	10
E. Locating information	1	2	3	4	5	6	7	8	9	10
F. Reading professional literature	1	2	3	4	5	6	7	8	9	10
G. Department or project meetings	1	2	3	4	5	6	7	8	9	10
H. Informal discussions with colleagues	1	2	3	4	5	6	7	8	9	10
I. Other (specify:_______)	1	2	3	4	5	6	7	8	9	10

9. Since joining Monsanto how many times has your official job title changed?

____

10. Please list all official job titles, dates, and employers you have had in the past five years: (List most current first.)

Dates	Job Title	Organization Name
		Monsanto

11. A. Mark all types of work that you have engaged in for a year or more since earning your highest degree (do not include part-time work while in graduate school).

B. Mark the one type of primary work you were engaged in immediately prior to taking a job at Monsanto.

	A All types of work (check all that apply)	B Primary work before joining Monsanto (check one)
a. Teaching or administration in an elementary or secondary school.	______	______
b. Full-time teaching in a college or university.	______	______
c. Full-time research in a college or university.	______	______
d. Teaching and research in a college or university.	______	______
e. Research and development in business or industry.	______	______
f. Research and development in a governmental agency.	______	______
g. Executive or administration position outside education.	______	______
h. Other professional position (specify:________________).	______	______
i. Student.	______	______
j. Other (specify:____________).	______	______

12. Indicate how frequently you used each of the sources on the list of sources of information during the last year. (If in the event your job does not require the use of any of these information sources over the past year, check all Ns.)

	Never used - N	Used seldom (1 or 2 times) - S	Used occasionally (3-5 times) - O	Used frequently (6-8 times) - F	Used routinely (9 or more times) - R
A. Your own collection of information, i.e., your personal files.	N	S	O	F	R
B. Your own search through standard generally available indexes to the literature, e.g., Chemical Titles.	N	S	O	F	R
C. Your own scanning of standard generally available abstract bulletins e.g., Chemical Abstracts.	N	S	O	F	R
D. Your own scanning of in-house prepared Monsanto abstracts, e.g., Monsanto Content Previews.	N	S	O	F	R
E. Your own scanning of primary journals or other primary sources.	N	S	O	F	R
F. Your own browsing in the Monsanto library.	N	S	O	F	R
G. Your selection of a publication from a citation in another publication.	N	S	O	F	R
H. From a colleague on the same job level at Monsanto.	N	S	O	F	R
I. From a colleague or friend outside of Monsanto.	N	S	O	F	R
J. From your immediate supervisor.	N	S	O	F	R
K. From another supervisor at Monsanto.	N	S	O	F	R
L. From a librarian, information specialist, or another Monsanto employee assigned to provide information.	N	S	O	F	R
M. From a technician.	N	S	O	F	R
N. From an on-line searched bibliographic data base.	N	S	O	F	R
O. Other (Please specify: ______)	N	S	O	F	R

13. Indicate how useful each of the sources on the list below was for meeting the requirement of the project(s) in which you were engaged during the past year. (In the event your job did not require the use of any of the information sources, check all 1's).

	Did not use - 1	Used but of little help - 2	Used and of some help - 3	Important resource for project(s) - 4
A. Your own collection of information, i.e., your personal files.	1	2	3	4
B. Your own search through standard generally available indexes to the literature, e.g., Chemical Titles.	1	2	3	4
C. Your own scanning of standard generally available abstract bulletins e.g., Chemical Abstracts.	1	2	3	4
D. Your own scanning of in-house prepared Monsanto abstracts, e.g., Monsanto Content Previews.	1	2	3	4
E. Your own scanning of primary journals or other primary sources.	1	2	3	4
F. Your own browsing in the Monsanto library.	1	2	3	4
G. Your selection of a publication from a citation in another publication.	1	2	3	4
H. From a colleague on the same job level at Monsanto.	1	2	3	4
I. From a colleague or friend outside of Monsanto.	1	2	3	4
J. From your immediate supervisor.	1	2	3	4
K. From another supervisor at Monsanto.	1	2	3	4
L. From a librarian, information specialist, or another Monsanto employee assigned to provide information:	1	2	3	4
M. From a technician.	1	2	3	4
N. From an on-line searched bibliographic data base.	1	2	3	4
O. Other (Please specify:	1	2	3	4

14. Evaluate the utility of information sources in terms of your information needs and preferences. (Indicate the importance you assign to each of the listed factors.)

	Essential	Very Important	Some Importance	Not Important
A. Local availability.	E	V	S	N
B. Up-to-dateness.	E	V	S	N
C. Response time in obtaining citation/abstract.	E	V	S	N
D. Response time in obtaining full copy of original document.	E	V	S	N
E. Accuracy/Authoritativeness	E	V	S	N
F. Comprehensiveness/Completeness	E	V	S	N
G. Direct useability without librarian assistance.	E	V	S	N
H. Other (please specify: ______)	E	V	S	N

15. For these activities listed below in which you occasionally engaged, if only <u>one</u> information source could be used, which would you choose? (Indicate by placing the letter standing for the information source, listed in question 12 and 13. Report an N/A if the activity is not applicable to your work in the past year.)

    a. To keep up with new developments on a topic ________.

    b. To find out what is reported in the literature on a topic ________.

    c. To brush up on a topic ________.

    d. To look for specific facts related to on-going project ________.

    e. To look for descriptions of procedures related to an on-going project ________.

    f. To prepare for a meeting within the Company ________.

    g. To prepare an internal report ________.

    h. To prepare a paper for external presentation or publication ________.

    i. To prepare a patent application ________.

    j. To prepare a review of the literature ________.

16. If you were limited to the use of only three information sources of the list in questions 12 and 13, which ones would you choose? Mark answer by placing the letter standing for the information source that would be your first choice, your second choice, your third choice, and your last choice.

    First choice:__________

    Second choice:__________

    Third choice:__________

    Last choice:__________

17. Evaluate the following possible changes in your work setting with respect to their potential for improving your work as a scientist. Indicate your evaluation of whether more or less would be beneficial for each item.

	Substantially more - A	Somewhat more - B	About right - C	Somewhat less - D	Substantially less - E
A. Supervision	A	B	C	D	E
B. Informal discussion with colleagues	A	B	C	D	E
C. Technical assistance	A	B	C	D	E
D. Secretarial assistance	A	B	C	D	E
E. Laboratory facilities	A	B	C	D	E
F. Autonomy in my work	A	B	C	D	E
G. Access to published information	A	B	C	D	E
H. Access to in-house Monsanto reports	A	B	C	D	E
I. Structured time	A	B	C	D	E
J. Formal recognition for innovation or discovery	A	B	C	D	E
K. Involvement in professional community	A	B	C	D	E
L. Role in organizational decision-making	A	B	C	D	E

18. Indicate your attitude concerning each of the following statements by circling one of the following categories: Strongly agree (SA), Agree somewhat (AS), Disagree somewhat (DS), and Strongly disagree (SD).

A.	It is advantageous for a scientist to perform his/her own information search.	SA AS DS SD
B.	Present means of locating information in this organization are adequate.	SA AS DS SD
C.	The company librarian or information specialist serves a useful function.	SA AS DS SD
D.	Research done here is at the forefront of knowledge in my field.	SA AS DS SD
E.	The administration of this organization facilitates quality research.	SA AS DS SD
F.	If I could retrace my steps, I would choose another area of specialization.	SA AS DS SD
G.	If I could retrace my steps, I would choose a different kind of work setting.	SA AS DS SD
H.	Professional scientists in research roles have too small a part in organizational decision-making.	SA AS DS SD
I.	Not enough opportunity is given scientists in this organization for individual initiative in research.	SA AS DS SD
J.	Lack of financial resources is the major restraint on quality research in this organization.	SA AS DS SD
K.	Source materials (published or unpublished literature) and reference books available in this organization are:	
	a) generally adequate for my needs	SA AS DS SD
	b) too time-consuming to locate	SA AS DS SD
	c) kept up to date	SA AS DS SD

19. An on-line searched bibliographic service allows scientists to quickly search the literature pertaining to a particular information need. By typing in index terms on a computer terminal, a researcher can obtain a list of potentially relevant document citations within a matter of minutes.

A. Have you ever used an on-line search system? Yes_____ No_____

B. If not, are you familiar with the functions of such a system?

Yes_____ No_____

C. Would an on-line searched bibliographic service significantly improve your current method of doing an information search?

Yes_____ No_____ Don't know_____

D. Please comment on the potential utility of an on-line search system for your work and for Monsanto needs in general.

____

____

____

____

____

20. Year of your birth: 19____.

21. What is today's date on which you completed this questionnaire

____/_____/______
mo. day year

22. At which Monsanto facility do you work?

_____Pensacola

_____Other company location
(Please specify:_________________________)

23. If you have any comments about this questionnaire, or if you wish to clarify any of your preceding responses, please do so below.

____

____

____

____

April 26, 1977

Dear Colleague:

Since May 1976 you have been offered the opportunity to participate in a study of on-line search services. This study is sponsored by the National Science Foundation with the participation of the Florida State University Chemistry Department and Monsanto Textiles Company.

We are now interested in learning whether the availability of the on-line search service assisted you in selecting information for your professional tasks. The attached questionnaire is the post survey instrument for this stage of the study. During the period of collecting responses to this survey, we are suspending on-line search services. Subsequent to this activity, we would plan to again introduce the service and to conduct selected interviews, contingent on NSF renewal of the project for another year of funding.

Whether or not you used the search service, please fill out the attached questionnaire and return it by May 10, 1977 to On-Line Search Project, Chemistry Research Building, Room 105. The questionnaire is coded only for follow-up purposes. All replies will be treated confidentially. Frank, candid responses will be appreciated so that the results of this study may assist in improving technical information service.

We enjoy the opportunity to provide you with assistance when needed, and appreciate your cooperation in completing the questionnaire.

Please call Gery Jahoda (4-2242) or Al Bayer (4-6416) if you have any questions about the study or the questionnaire.

Sincerely,

Al Bayer

Al Bayer
Sociology

Gery Jahoda

Gery Jahoda
Library Science

SURVEY OF THE INFORMATION STYLE OF FLORIDA STATE UNIVERSITY CHEMISTS

1. Your F.S.U. User number: ____________

2. Based on an average week, how many hours, on the average, do you actually spend in each of the following activities related to your position at F.S.U., including time spent after regular working hours, if applicable? (Circle one number for each listed activity).

ACTIVITIES	None	1-4 hrs.	5-8 hrs.	9-12 hrs.	13-16 hrs.	17-20 hrs.	21-24 hrs.	25-28 hrs.	29-32 hrs.	33 or more
	AVERAGE TIME PER WEEK									
A. Administration	1	2	3	4	5	6	7	8	9	10
B. Locating information	1	2	3	4	5	6	7	8	9	10
C. Reading professional literature	1	2	3	4	5	6	7	8	9	10
D. Laboratory research, data analysis and computer processing	1	2	3	4	5	6	7	8	9	10
E. Writing or preparing research reports or professional papers	1	2	3	4	5	6	7	8	9	10
F. Institutional or departmental meetings	1	2	3	4	5	6	7	8	9	10
G. Informal discussions with colleagues	1	2	3	4	[illegible]	6	7	8	9	10
H. Teaching (including preparation, lecturing and testing/grading)	1	2	3	4	5	6	7	8	9	10
I. Advising and counseling students (including individual student's committees)	1	2	3	4	5	6	7	8	9	10
J. Attending class as a student and related studying activities	1	2	3	4	5	6	7	8	9	10
K. Other (please specify) ____________ ____________	1	2	3	4	5	6	7	8	9	10

3. Indicate how frequently you used each of the sources on the list of sources of information during the last year. Please circle the appropriate response for each listed source.

SOURCES	Never used - N	Used seldom (1 or 2 times) - S	Used occasionally (3-5 times) - O	Used frequently (6-8 times) - F	Used routinely (9 or more times) - R
A. Your own collection of information, i.e., your personal files.	N	S	O	F	R
B. Your own search through indexes to the literature, e.g., Chemical Titles.	N	S	O	F	R
C. Your own scanning of abstract bulletins or table of contents services, e.g., Chemical Abstracts, Current Contents.	N	S	O	F	R
D. Your own scanning of primary journals or other primary sources.	N	S	O	F	R
E. Your own browsing in the FSU Strozier Library.	N	S	O	F	R
F. Your selection of a publication from a citation in another publication.	N	S	O	F	R
G. From a faculty member at FSU.	N	S	O	F	R
H. From a student at FSU.	N	S	O	F	R
I. From a colleague or friend outside of FSU.	N	S	O	F	R
J. From a non-student technician/laboratory assistant.	N	S	O	F	R
K. From an FSU Strozier librarian.	N	S	O	F	R
L. From the on-line search services available in the Chemistry Research Building.	N	S	O	F	R
M. From on-line search services other than that available in the Chemistry Research Bldg.	N	S	O	F	R
N. From a commercially computer searched current awareness service, e.g., I.S.I. machine search current awareness.	N	S	O	F	R
O. Other (please specify) ______________	N	S	O	F	R

4. Indicate how useful each of the sources on the list below was for meeting the requirement of the project(s) in which you were engaged during the past year. Please circle the appropriate response for each listed source.

SOURCES	Did not use - 1	Used but of little help - 2	Used and of some help - 3	Important resource for project(s) - 4
A. Your own collection of information, i.e., your personal files.	1	2	3	4
B. Your own search through indexes to the literature, e.g., Chemical Titles.	1	2	3	4
C. Your own scanning of abstract bulletins or table of contents services, e.g., Chemical Abstracts, Current Contents.	1	2	3	4
D. Your own scanning of primary journals or other primary sources.	1	2	3	4
E. Your own browsing in the FSU Strozier Library.	1	2	3	4
F. Your selection of a publication from a citation in another publication.	1	2	3	4
G. From a faculty member at FSU.	1	2	3	4
H. From a student at FSU.	1	2	3	4
I. From a colleague or friend outside of FSU.	1	2	3	4
J. From a non-student technician/laboratory assistant.	1	2	3	4
K. From an FSU Strozier librarian.	1	2	3	4
L. From an on-line searched bibliographic data base.	1	2	3	4
M. From a commercially computer searched current awareness service, e.g., I.S.I. machine searched current awareness.	1	2	3	4
N. Other (please specify) ________________	1	2	3	4

5. Evaluate the utility of information sources in terms of your information needs and preferences. (Indicate the importance you assign to <u>each</u> of the listed factors).

	Essential	Very Important	Some Importance	Not Important
A. Local availability.	E	V	S	N
B. Up-to-dateness.	E	V	S	N
C. Response time in obtaining citation/abstract.	E	V	S	N
D. Response time in obtaining full copy of original document.	E	V	S	N
E. Accuracy/Authoritativeness	E	V	S	N
F. Comprehensiveness/Completeness	E	V	S	N
G. Direct usability without librarian assistance.	E	V	S	N
H. Other (please specify) ________________	E	V	S	N

6. Evaluate the on-line search service available in the Chemistry Research Building in terms of your information needs whether or not you have used this service. (Indicate your opinion concerning the adequacy of each of the listed factors).

	Very Good - VG	Good - G	Fair - F	Poor - P	Very Poor - VP
A. Coverage of the literature (journals, patents, reports, and other source material indexed in the bibliographic data base)					
1. Subjects included	VG	G	F	P	VP
2. Specific journal titles, patents, reports, and other publications included	VG	G	F	P	VP
3. Up-to-dateness of literature included	VG	G	F	P	VP
4. Adequacy for retrospective searching (going back far enough in time)	VG	G	F	P	VP
B. Interaction with system					
1. Search service hours in Chemistry Research Building	VG	G	F	P	VP
2. Performance of searches by information specialists	VG	G	F	P	VP
3. Information provided about the on-line search system	VG	G	F	P	VP
4. Subject access, i.e., keywords, subject headings, descriptors	VG	G	F	P	VP
5. Other access points, e.g., author, work location, language, year	VG	G	F	P	VP
6. Ease of use	VG	G	F	P	VP
C. Search results					
1. Lapsed time for obtaining search results on-line	VG	G	F	P	VP
2. Lapsed time for obtaining search results off-line	VG	G	F	P	VP
3. Completeness of search results	VG	G	F	P	VP

4. Exclusion of non-relevant citations	VG	G	F	P	VP
5. Availability of full text of relevant citations in personal collections of journals, reprints, etc.	VG	G	F	P	VP
6. Availability of full text of relevant citations in Strozier Library	VG	G	F	P	VP
7. Availability of full text of relevant citations via inter-library loan	VG	G	F	P	VP

7. For those activities listed below indicate your opinion of the utility of on-line searches. Please answer even if you have not used on-line services. (Please circle the most appropriate response for each activity).

<u>Utility of on-line bibliographic services:</u>	Best method available - B	Very useful - V	Somewhat useful - S	Not useful - N
a. To keep up with new developments on a topic	B	V	S	N
b. To find out what is reported in the literature on a topic	B	V	S	N
c. To brush up on a topic	B	V	S	N
d. To look for specific facts related to on-going project	B	V	S	N
e. To look for descriptions of procedures related to an on-going project	B	V	S	N
f. To prepare for teaching	B	V	S	N
g. To prepare grant proposals or grant reports	B	V	S	N
h. To prepare a paper for external presentation or publication	B	V	S	N
i. To prepare a patent application/disclosure	B	V	S	N
j. To prepare a review of the literature	B	V	S	N

8. Indicate your attitude concerning each of the following statements by circling one of the following categories: Strongly agree (SA), Agree somewhat (AS), Disagree somewhat (DS), and Strongly disagree (SD).

A. My present means of locating scientific information are adequate.	SA	AS	DS	SD
B. A Chemistry Department librarian or information specialist would serve a useful function.	SA	AS	DS	SD
C. It is advantageous for a scientist to perform his/her own information search.	SA	AS	DS	SD
D. Finding citations without using an on-line search service is easy compared to locating the full text of the document.	SA	AS	DS	SD
E. Finding citations by using an on-line search service is easy compared to locating the full text of the document.	SA	AS	DS	SD
F. I prefer to delegate literature searches to someone else.	SA	AS	DS	SD
G. On-line searches allow one to spend more time reading the literature.	SA	AS	DS	SD
H. On-line searches allow one to spend less time in searching the literature.	SA	AS	DS	SD
I. If one relies on only on-line searches, important citations would be missed.	SA	AS	DS	SD
J. I prefer to delegate formulation of search strategies for on-line searches to someone else.	SA	AS	DS	SD
K. The results of an on-line search should be double checked manually against the corresponding printed indexes.	SA	AS	DS	SD
L. On-line searches enable one to increase scholarly productivity.	SA	AS	DS	SD
M. On-line searches are too time consuming.	SA	AS	DS	SD
N. On-line searches retrieve too many useless articles in foreign languages.	SA	AS	DS	SD
O. I prefer to do my own on-line searching including "hands-on" use of the computer terminal myself.	SA	AS	DS	SD

P. A search on CHEMCON (CA Condensates. on-line) costs $1.65 per minute; the average search takes 10-15 minutes or approximately $20.00.

1. Chemistry Department funds should be made available for on-line searches.	SA	AS	DS	SD
2. I would be willing to ask for funds in a grant or contract proposal to cover on-line search services.	SA	AS	DS	SD
3. I would be willing to pay out of pocket for on-line searches.	SA	AS	DS	SD

9.

I. Indicate how many of each of the following activities you have performed in the last 12 months (if none, mark zero).

II. Indicate the number of these for which literature searches were performed in the last 12 months (if none, mark zero).

III. Indicate how many of each of these were searched via on-line searching in the last 12 months (if none, mark zero).

	I how many?	II how many of I required literature searches?	III how many of II used on-line searches?
A. Preparation of manuscripts, papers, or reports for meetings or publication (include dissertation, if applicable)	______	______	______
B. Preparation of grant or contract proposals	______	______	______
C. Preparation of new courses or modification of old courses	______	______	______
D. Preparation of other technical papers or reports not for publication	______	______	______
E. Other activities requiring literature searches (Please specify) ______	XXXX	______	______

10. Please comment on the advantages of on-line search services for your work and for the Florida State University Chemistry Department needs in general.

11. Please comment on the disadvantages of on-line search services for your work and for the Florida State University Chemistry Department needs in general.

12. What is today's date on which you completed this questionnaire?

____/____/____
mo. day year

13. If you have any comments about this questionnaire, or if you wish to clarify any of your preceding responses, please do so below.

SURVEY OF THE INFORMATION STYLE OF MONSANTO SCIENTIFIC AND TECHNICAL PERSONNEL

1. Your Monsanto survey code number: ______________________________

2. Based on an average week, how many hours, on the average, do you actually spend in each of the following activities related to your position at Monsanto, including time spent after regular working hours, if applicable? (Circle one number for each listed activity.)

Activities	Average Time Per Week									
	None	1-4 hrs.	5-8 hrs.	9-12 hrs.	13-16 hrs.	17-20 hrs.	21-24 hrs.	25-28 hrs.	29-32 hrs.	33 or more
A. Administration	1	2	3	4	5	6	7	8	9	10
B. Work in a laboratory	1	2	3	4	5	6	7	8	9	10
C. Writing or preparing research reports	1	2	3	4	5	6	7	8	9	10
D. Writing or preparing professional papers	1	2	3	4	5	6	7	8	9	10
E. Locating information	1	2	3	4	5	6	7	8	9	10
F. Reading professional literature	1	2	3	4	5	6	7	8	9	10
G. Department or project meetings	1	2	3	4	5	6	7	8	9	10
H. Informal discussions with colleagues	1	2	3	4	5	6	7	8	9	10
I. Other (Please specify), ______________	1	2	3	4	5	6	7	8	9	10

3. Indicate how frequently you used each of the sources on the list of sources of information during the last year. (If in the event your job did not require the use of any of these information sources over the past year, circle all N's.)

Sources	Never used - N	Used seldom (1 or 2 times) - S	Used occasionally (3-5 times) - O	Used frequently (6-8 times) - F	Used routinely (9 or more times) -R
A. Your own collection of information, i.e., your personal files.	N	S	O	F	R
B. Your own search through standard, generally available indexes to the literature, e.g., Chemical Titles.	N	S	O	F	R
C. Your own scanning of standard, generally available abstract bulletins e.g., Chemical Abstracts.	N	S	O	F	R
D. Your own scanning of in-house prepared Monsanto abstracts, e.g., Monsanto Content Previews.	N	S	O	F	R
E. Your own scanning of primary journals or other primary sources.	N	S	O	F	R
F. Your own browsing in the Monsanto library.	N	S	O	F	R
G. Your selection of a publication from a citation in another publication.	N	S	O	F	R
H. From a colleague on the same job level at Monsanto.	N	S	O	F	R
I. From a colleague or friend outside of Monsanto.	N	S	O	F	R
J. From your immediate supervisor.	N	S	O	F	R
K. From another supervisor at Monsanto.	N	S	O	F	R
L. From a librarian, information specialist, or another Monsanto employee assigned to provide information.	N	S	O	F	R
M. From a technician.	N	S	O	F	R

3. Continued.

	Never used - N	Used seldom (1 or 2 times) - S	Used occasionally (3-5 times) - O	Used frequently (6-8 times) - F	Used routinely (9 or more times) - R
N. From the NSF-sponsored (free) on-line services available at Monsanto.	N	S	O	F	R
O. From on-line search services other than what is available through the NSF-sponsored study (i.e., charged to your cost center).	N	S	O	F	R
P. Other (Please specify) ____________ ____________________________	N	S	O	F	R

4. Indicate how useful each of the sources on the list below was for meeting the requirement of the project(s) in which you were engaged during the past year. (In the event your job did not require the use of any of the information sources, circle all 1's.)

Sources	Did not use -1	Used but of little help -2	Used and of some help -3	Important resource for project(s) -4
A. Your own collection of information, i.e., your personal files.	1	2	3	4
B. Your own search through standard, generally available indexes to the literature, e.g., Chemical Titles.	1	2	3	4
C. Your own scanning of standard, generally available abstract bulletins e.g., Chemical Abstracts.	1	2	3	4
D. Your own scanning of in-house prepared Monsanto abstracts, e.g., Monsanto Content Previews.	1	2	3	4
E. Your own scanning of primary journals or other primary sources.	1	2	3	4
F. Your own browsing in the Monsanto library.	1	2	3	4
G. Your selection of a publication from a citation in another publication.	1	2	3	4
H. From a colleague on the same job level at Monsanto.	1	2	3	4
I. From a colleague or friend outside of Monsanto.	1	2	3	4
J. From your immediate supervisor.	1	2	3	4
K. From another supervisor at Monsanto.	1	2	3	4
L. From a librarian, information specialist, or another Monsanto employee assigned to provide information.	1	2	3	4
M. From a technician.	1	2	3	4
N. From an on-line searched bibliographic data base.	1	2	3	4
O. Other (Please specify) ______________	1	2	3	4

5. Evaluate the utility of information sources in terms of your information needs and preferences. (Indicate the importance you assign to each of the listed factors.)

	Essential	Very Important	Some Importance	Not Important
A. Local availability.	E	V	S	N
B. Up-to-dateness.	E	V	S	N
C. Response time in obtaining citation/abstract.	E	V	S	N
D. Response time in obtaining full copy of original document.	E	V	S	N
E. Accuracy/Authoritativeness	E	V	S	N
F. Comprehensiveness/Completeness	E	V	S	N
G. Direct usability without librarian assistance.	E	V	S	N
H. Other (please specify) ____________ ____________________	E	V	S	N

6. Evaluate the NSF-sponsored on-line search service (exclude searches charged to another budget) available at Monsanto in terms of your information needs whether or not you have used this service. (Indicate your opinion concerning the adequacy of each of the listed factors).

	Very Good - VG	Good - G	Fair - F	Poor - P	Poor - VP
A. Coverage of the literature (journals, patents, reports, and other source material indexed in the bibliographic data base)					
1. Subjects included	VG	G	F	P	VP
2. Specific journal titles, patents, reports, and other publications included	VG	G	F	P	VP
3. Up-to-dateness of literature included	VG	G	F	P	VP
4. Adequacy for retrospective searching (going back far enough in time)	VG	G	F	P	VP
B. Interaction with system					
1. Search service hours at Monsanto	VG	G	F	P	VP
2. Performance of searches by library information specialists	VG	G	F	P	VP
3. Information provided about the on-line search system	VG	G	F	P	VP
4. Subject access, i.e., keywords, subject headings, descriptors	VG	G	F	P	VP
5. Other access points, e.g., author, work location, language, year	VG	G	F	P	VP
6. Ease of use	VG	G	F	P	VP
C. Search results					
1. Lapsed time for obtaining search results on-line	VG	G	F	P	VP
2. Lapsed time for obtaining search results off-line	VG	G	F	P	VP

3. Completeness of search results	VG	G	F	P	VP
4. Exclusion of non-relevant citations	VG	G	F	P	VP
5. Availability of full text of relevant citations in personal collections of journals, reprints, etc.	VG	G	F	P	VP
6. Availability of full text of relevant citations at this Monsanto facility.	VG	G	F	P	VP
7. Availability of full text of relevant citations via inter-library loan	VG	G	F	P	VP

7. For those activities listed below indicate your opinion of the utility of on-line searches. Please answer, even if you have not used on-line services.

Utility of on-line bibliographic services:	Best method available - B	Very useful - V	Somewhat useful - S	Not useful - N
a. To keep up with new developments on a topic	B	V	S	N
b. To find out what is reported in the literature on a topic	B	V	S	N
c. To brush-up on a topic	B	V	S	N
d. To look for specific facts related to on-going project	B	V	S	N
e. To look for descriptions of procedures related to an on-going project	B	V	S	N
f. To prepare for a meeting within the company	B	V	S	N
g. To prepare an internal report	B	V	S	N
h. To prepare a paper for external presentation or publication	B	V	S	N
i. To prepare a patent application/disclosure	B	V	S	N
j. To prepare a review of the literature	B	V	S	N

8. Indicate your attitude concerning each of the following statements by circling one of the following categories: Strongly agree (SA), Agree somewhat (AS), Disagree somewhat (DS), and Strongly disagree (SD).

A.	My present means of locating information in this organization are adequate.	SA	AS	DS	SD
B.	A company librarian or information specialist serves a useful function.	SA	AS	DS	SD
C.	It is advantageous for a scientist to perform his/her own information search.	SA	AS	DS	SD
D.	Finding citations without using an on-line search service is easy compared to locating the full text of the document.	SA	AS	DS	SD
E.	Finding citations by using an on-line search service is easy compared to locating the full text of the document.	SA	AS	DS	SD
F.	I prefer to delegate literature searches to someone else.	SA	AS	DS	SD
G.	On-line searches allow one to spend more time reading the literature.	SA	AS	DS	SD
H.	On-line searches allow one to spend less time in searching the literature.	SA	AS	DS	SD
I.	If one relies on only on-line searches, important citations would be missed.	SA	AS	DS	SD
J.	I prefer to delegate formulation of search strategies for on-line searches to someone else.	SA	AS	DS	SD
K.	The results of an on-line search should be double checked manually against the corresponding printed indexes.	SA	AS	DS	SD
L.	On-line searches enable one to increase scholarly productivity.	SA	AS	DS	SD
M.	On-line searches are too time consuming.	SA	AS	DS	SD
N.	On-line searches retrieve too many useless articles in foreign languages.	SA	AS	DS	SD
O.	I prefer to do my own on-line searching including "hands-on" use of the computer terminal myself.	SA	AS	DS	SD

P. A search on CHEMCON (CA Condensates on-line) costs $1.65 per minute: the average search takes 10-15 minutes or approximately $20.00.

1. Company funds should be budgeted to the library for on-line searches. SA AS DS SD

2. My cost center should be willing to pay for on-line searches. SA AS DS SD

9. I. Indicate how many of each of the following activities you have performed in the last 12 months (if none, mark zero).

II. Indicate the number of these for which literature searches were performed in the last 12 months (if none, mark zero).

III. Indicate how many of each of these were searched via on-line searching in the last 12 months (if none, mark zero).

	I how many?	II how many of I required literature searches?	III how many of II used on-line searches?
A. Preparation of manuscripts, papers, or reports for meetings or publication			
B. Preparation of grant or contract proposals			
C. Preparation of other technical papers or reports not for publication			
D. Other activities requiring literature searches (Please specify)			
	XXX		

10. Please comment on the advantages of on-line search services for your work and for Monsanto needs in general.

11. Please comment on the disadvantages of on-line search services for your work and for Monsanto needs in general.

12. What is today's date on which you completed this questionnaire?

_____/_____/_____
mo. day year

13. If you have any comments about this questionnaire, or if you wish to clarify any of your preceding responses, please do so below.

Please return this to: Paul W. Gann, Library Systems
Monsanto Textiles Company
P.O. Box 12830
Pensacola, Florida 32575

Searched by ____________
Date searched ____________

User ____________
FSU search # ____________

INFORMATION SPECIALIST'S RECORD OF ON-LINE USE

PRE-SEARCH

1. Search request received:
   [ ]in writing [ ]in person [ ] by phone
   [ ]by other than final user

2. Relationship to previous searches:
   [ ]new search
   [ ]continuation/update of previous search
   [ ]modification of previous search

3. Initial search request:
   [ ]synonyms supplied by user
   [ ]logic supplied by user
   constraints supplied by user:
   [ ]English language only
   [ ]author (personal)
   [ ]types of publications (specify:____________ ____________)
   [ ]maximum # of citations wanted (specify: ____________)
   [ ]time period to search (specify:____________ ____________)
   [ ]other restrictions (specify: ____________)

4. Primary applications
   [ ]teaching [ ]research
   [ ]other (specify:____________ ____________)

5. User's types of approaches and purposes for this search:

TYPES OF APPROACH:
[ ]current awareness [ ]exhaustive
[ ]a few references on topic [ ]browsing
[ ]specific facts or procedures

PURPOSE OF USE:
Keeping current on:
[ ]developments in own areas of competence
[ ]developments in related areas

Developing competence by:
[ ]brushing up (relearning)
[ ]learning new specialty

Supporting work related to on-going project:
[ ]theory [ ]facts
[ ]procedures, apparatus or methodology

Preparing reports or for meeting or publication:
[ ]internal meeting [ ]internal report
[ ]patent application
[ ]publication or paper for external dissemination
[ ]other (specify:____________)

6. Sources employed by user for searching this topic prior to seeking this on-line search:
   [ ]manual self-search of printed indexes
   [ ]self-search of on-line system aids (SDC microfiche, etc.)
   [ ]self search in researcher's journals, reprints & other personal collections
   [ ]discuss with colleague
   [ ]other (specify:____________)

7. Negotiation time (pre-terminal) in min:____
   Also see question 17.

POST-SEARCH

8. Files searched:
   [ ]CHEMCON [ ]CHEM7071 [ ]COMPENDEX
   [ ]other (specify:____________)

9. Number of search statements:____________

10. Unique citations printed on-line:____________

11. Citations printed off-line:____________

12. Connect time in minutes:____________

13. Time with user (post-search) in min.____________

14. User present during entire search:
    [ ]no yes,[ ]by telephone [ ]in person

15. Did user interaction take place during the search? [ ]no [ ]yes

16. Did technical problems delay the on-line search? [ ]no yes, was it:
    [ ]log-on problem [ ]TYMSHARE problems
    [ ]other (specify:____________)

17. What funds are paying for this search?
    [ ]User's own grant
    [ ]Major professor's grant
    [ ]Departmental funds
    [ ]other (specify:____________)

Searched by ______
Date searched ______

MTC user# ______
MTC search# ______

INFORMATION SPECIALIST'S RECORD OF ON-LINE USE

PRE-SEARCH

1. Search request received:
   - [ ] in writing
   - [ ] in person
   - [ ] by phone
   - [ ] by other than final user

2. Relationship to previous searches:
   - [ ] new search
   - [ ] continuation/update of previous search
   - [ ] modification of previous search

3. Initial search request:
   - [ ] synonyms supplied by user
   - [ ] logic supplied by user

   constraints supplied by user:
   - [ ] English language only
   - [ ] author (personal)
   - [ ] types of publications (specify: ______)
   - [ ] maximum # of citations wanted (specify: ______)
   - [ ] time period to search (specify: ______)
   - [ ] other restrictions (specify: ______)

4. User's types of approaches and purposes for this search:

TYPES OF APPROACH:
- [ ] current awareness
- [ ] exhaustive
- [ ] a few references on topic
- [ ] browsing
- [ ] specific facts or procedures

PURPOSE OF USE:

Keeping current on:
- [ ] developments in own areas of competence
- [ ] developments in related areas

Developing competence by:
- [ ] brushing up (relearning)
- [ ] learning new specialty

Supporting work related to on-going project:
- [ ] theory
- [ ] facts
- [ ] procedures, apparatus or methodology

Preparing reports or for meeting or publica
- [ ] internal meeting
- [ ] internal report
- [ ] patent application
- [ ] publication or paper for external dissemination
- [ ] other (specify: ______

5. Sources employed by user for searching this topic prior to seeking this on-line search:
   - [ ] manual self-search of printed indexes,
   - [ ] self-search of on-line system aids (SDC microfiche, etc.)
   - [ ] self-search in researcher's journals, reprints and other personal collection
   - [ ] discuss with colleague
   - [ ] internal company report
   - [ ] other (specify: ______

POST-SEARCH

6. Files searched:
   - [ ] CHEMCON
   - [ ] CHEM7071
   - [ ] COMPENDEX
   - [ ] other (specify: ______

7. Number of search statements: ______

8. Number of unique citations printed on-line ______

9. Number of citations printed off-line ______

10. Connect time in minutes ______

11. User present during entire search:
    - [ ] no; yes, by
    - [ ] telephone
    - [ ] in person

12. Did user interaction take place during the search?
    - [ ] no
    - [ ] yes

13. Did technical problems delay the on-line search?
    - [ ] no; yes, was it
    - [ ] log-on problem;
    - [ ] TYMSHARE problems
    - [ ] other (specify: ______

FSU User ____________
FSU Search No. ____________

USER'S REACTION TO ON-LINE SEARCH

We would appreciate your help in evaluating the attached computer search results. When you have had an opportunity to review the citations (off-line and on-line), please answer the questions below.

Fold, staple and mail the completed questionnaire via campus mail to On-line Search Project, Chemistry Research Building (Unit 1), Rm. 105.

1. The number of citations retrieved by this search was ____________.

   a. Of these citations approximately how many were familiar to you prior to this search and potentially relevant to the search topic? ____________

   b. Of these citations, approximately how many were new references to you (previously unfamiliar) and potentially relevant to the search topic? ____________

   c. Approximately how many other citations were familiar to you and relevant to the search topic but not retrieved by this search? ____________

   d. Approximately how many citations retrieved by this search do you plan to investigate further? ____________

2. What is your opinion on the number of citations retrieved?

   [ ] just about the right number   [ ] too many citations   [ ] not enough citations

3. What is your opinion of the currency (up-to-dateness) of the search results?

   [ ] Very Satisfactory   [ ] Satisfactory   [ ] Unsatisfactory
   [ ] Highly Unsatisfactory   [ ] Does not Apply

4. What is your opinion on the utility of the search results for your intended purpose?

   [ ] Very Useful   [ ] Of Some Use   [ ] Of Marginal Utility
   [ ] Of No Use

5. Any additional comments you have regarding this search may be listed here (attach any additional sheets if desired).

Return to: Paul W. Ga...
Technical Library, MTC
Pensacola, Florida 32575

MTC user#________
MTC search#________

USER'S REACTION TO ON-LINE SEARCH

We would appreciate your help in evaluating the attached computer search results. When you have had an opportunity to review the citations (off-line and on-line), please answer the questions below.

1. The number of citations retrieved by this search was ______
   a. Approximately how many citations were familar to you prior to this search and potentially relevant to the search topic ? ________.
   b. Approximately how many citations were new references to you (previously unfamilar) and potentially relevant to the search topic ? ________.
   c. Approximately how many citations were familar to you and relevant to the search topic and not retrieved by this search ? ________.
   d. Approximately how many citations retrieved by this search do you plan to investigate further ? ________.

2. What is your opinion on the number of citations retrieved ?

   ☐ just about the right number ☐ too many citations ☐ not enough citations

3. What is your opinion of the currency (up-to-dateness) of the search results ?

   ☐ very satisfactory ☐ satisfactory ☐ unsatisfactory ☐ highly unsatisfactor

4. What is your opinion on the utility of the search results for your intended purpose ?

   ☐ very useful ☐ of some use ☐ of marginal utility ☐ of no use

5. Any additional comments you have regarding this search may be listed here (attach any additional sheets if desired).

GUIDELINES FOR FSU'S INFORMATION SPECIALIST'S RECORD OF ON-LINE USE

The following discussion and definitions may be helpful in completing the Information Specialist's Record of On-Line Use form. It is suggested that the user information, search number, "Searched by," "Date searched," and "Pre-Search" section be completed prior to the on-line search and that the "Post-Search" section be completed immediately following the terminal search, while the print-out is still available. Each separate search topic requires an Information Specialist's form and a User's Reaction form. If you are not sure it is a separate search topic, ask the user.

Pre-Search Questions

1. "Search request received": check all that apply. The phrase "in writing" refers to formal correspondence, as well as a few keywords jotted down on scrap paper. The phrase "other than final user" refers to requests received by a third party, *e.g.*, John Jones requests a search to be given to and used by Bill Smith; Bill Smith will complete the User's Reaction to On-Line Search form. If the request is received in writing, attach to the back of the Information Specialist's form.

2. "Relationship to previous searches": check one category only. A "new search" should be counted for each new topic that is not a "modification" or "continuation" of any previously conducted search. It is conceivable that more than one search will be received and conducted at one terminal session for more than one user. If you are not certain that it is a "new search" for the user present, ask the user.

Examples of a "continuation/update of previous search" are: (a) the search is performed on a different data base, *e.g.*, the search topic was initially searched on CHEMCON, the user then returns and requests

that the same topic be searched on SSIE, or, a search is done on CHEMCON, the user then returns and requests the same search be "downdated" on CHEM7Ø71; (b) a search is performed on CHEMCON, and a month later the user returns and requests that the same search be done for the last four weeks on CHEMCON, i.e., SDI service (selective dissemination of information).

A "modification of previous search" occurs when a new search strategy is adopted, additional keywords are employed, or other devices are used to change the approach to the topic which was previously searched. If you cross data bases during the same terminal session, count as one search (use one Information Specialist's form and one User's Reaction form) unless a different topic is searched. When crossing data bases, a certain amount of vocabulary change is necessary; however, count as a "continuation of previous search" unless based upon previous print-outs and/or user interaction, the search is so improved or changed that it must be counted as a "modification."

3. "Initial search request": check all that apply. An "initial search request" refers to the search request as it is presented to the information specialist by the user before negotiation takes place.

The word "synonym" should be used in its broadest sense, e.g., NMR or nuclear magnetic resonance; transition metal, organometallic, or manganese would be considered synonyms. It should be emphasized that this box is to be checked only if the synonyms are supplied by the user, not if they are suggested by the information specialist or elicited from the user during the negotiation process.

The phrase "logic supplied by user" should be checked if the user provides the appropriate Boolean operators or their equivalent, i.e., the user has some knowledge of how a search strategy is formulated and provides

the logic for linking key concepts or keywords.

The phrase "constraints supplied by user" refers to those items suggested for inclusion, exclusion, or consideration by the user, not those items supplied by the information specialist or elicited from the user during the negotiation or searching process. Examples of constraints are: citations in the English language only (and not foreign); personal authors (Smith, F. Harry); types of publications to be included or excluded (patents, journals, books, technical reports, conference proceedings, dissertations); maximum number of citations (the 20 most recent; no more than 100); time period (last update code; last two years only). Some examples of "other restrictions" are: CA section numbers; sponsoring agency; article title; journal name; review articles; and other language restrictions (English and French).

4. "Primary applications": check all that apply. "Teaching" includes searching for citations to prepare a lecture. "Research" also includes dissertation work. An example of "other" would be course related applications. Under "other" in question 5, one can further specify if the course related applications are for papers for seminars, classes, directed individual study, etc.

5. "User's types of approaches and purposes for this search": check all that apply. It is not necessary to check one box in each of the broader categories "Types of Approaches" or "Purpose of Use."

A "current awareness" type of approach is the same as SDI (selective dissemination of information). A good example of this type of approach is an update, e.g., the search statement -- ALL HYDROGEN# AND ALL BOND AND 7605(UP) -- to be executed on CHEMCON. Since the information specialist initiates permanent SDI requests, consider these as received

"by other than final user" (question 1). For each SDI request be sure to include time period constraint (question 3) on each Information Specialist's form. The user should react to each SDI update.

An "exhaustive" search implies a comprehensive, retrospective approach to a topic. In some cases the user requests only "a few references on [a] topic"; however, in many cases, the user's type of approach is to check through all relevant information existing on a topic (exhaustive) but he receives only a few references on a topic instead. Check the [illegible] next to the phrase or word most closely corresponding to the user's approach, not the word or phrase which corresponds to what the user received.

"Browsing" takes place when the user attempts to see what the system can do or what there is on a given subject in the data base in a manner that is not as systematic as "exhaustive" or a "few references on topic"; for example, "lanthanides" as a broad subject which is further narrowed on-line to "cerium." A user looking for citations to documents pertaining to equipment set-up or maintenance would be using the "specific facts or procedures" type of approach.

A search dealing with only one topic may be considered as "Keeping current on: developments...." even though such a search is not "current awareness" on an SDI type basis. An example of "developments in own areas of competence" might be the topic nuclear magnetic resonance (NMR) and nitrogen - 15; whereas, an example of "developments in related areas" might be the topic electron paramagnetic resonance (EPR or ESR) and nitrogen - 15. If you are in doubt as to "own" or "related" area of competence, ask the user.

In some cases a user might "brush up" on an earlier area of competence such as the topic statistics, or learn a "new specialty" such as the

biochemical topic active transport needed by an inorganic chemist. This is apt to occur when a new project is started. Any topic related to "supporting work related to on-going projects" might be "theory" (diffusion), "facts" (boiling point of water), or "procedures, apparatus or methodology" (Van de Graaff accelerator). The category "patent application" should be interpreted broadly to include patent disclosures as well. Examples of "other" include testing the system, grant proposals, dissertations, technical reports, or papers for seminars, course requirements, or directed individual study.

6. "Sources employed by user for searching this topic prior to seeking this on-line search": check all that apply. An example of "other" would be the use of print-out results from previous searches, e.g., to obtain different or additional keywords or to devise a new search strategy.

7. "Negotiation time": an estimated time. Include time spent with SDC microfiche, vocabulary aids, and working out strategy whether or not user is present. Do not include time spent learning the data base characteristics.

Post-Search Questions

8. "Files searched": check all that apply, e.g., more than one data base may be indicated. Examples of "other" include SSIE and NTIS.

9. "Number of search statements": the last SDC search statement with postings. If you restack rased all search statements, changed data bases, or in some other manner affected the SDC total number of search statements, please add the individual search statements together so that a total figure is given.

10. "Number of unique citations printed on-line": a hand count. "Unique" means not to count duplicate citations, e.g., if 5 citations are

printed by title only and then these same 5 are printed along with 4 others in a final listing of citations, count only 9 on-line citations, not 13. Citations printed on-line in abbreviated form (such as article title or "PRT TRIAL") do not have to be counted. Count only those containing sufficient information to locate the document.

Unless the user will be antagonized, the practice should be to repeat on-line citations in any off-line printouts. Two examples are as follows:

1) Jones, working with the information specialist, views three separate "PRT TRIAL" commands or a total of 6 records in narrowing his search. Ten citations are then printed on-line using the tailored print command "PRT 10, TI, AU, CP, SO, KW"; 100 citations (including the 10 printed on-line) are then printed off-line. The number of unique citations printed on-line (question 10) is thus 10; the number of citations printed off-line is 100 (question 11); and the total number of citations retrieved (question 1, User's Reaction form) is also 100 (not 110 or 116).

2) Fisher, working with the information specialist, views 20 titles on-line and selects 5 to be printed using the "PRT" command; he wants the other 15 citations to be printed off-line but insists that the 5 he already has not be repeated. Fill in 5 on-line citations for question 10, 15 off-line citations for question 11, and a total of 20 citations retrieved on the User's Reaction form, question 1 (not 40 or 45).

11. "Number of citations printed off-line": the number of postings printed using the command "PRT OFFLINE..." In many cases, the off-line and on-line citations will contain duplicate document citations. These duplicates should be subtracted before completing question 1 on the User's Reaction form (see the example under 10 above). The SDC flat charge per

citation encourages the use of "PRT FULL OFFLINE INDENTED" rather than the compact form where category names are abbreviated. Since this print command provides full information for the end-user, and also helps the information specialist by providing keywords for improving the search, it should be used whenever possible.

12. "Connect time in minutes": the number of minutes given when the command "TIME INTERVAL" or "TIME RESET" is used. If you forget to record this information during the initial search, the time given on the monthly SDC invoice may be used.

13. "Staff time with user": an estimated time. This time may include general discussion of print-out citations, the length of time it will take off-line print-outs to arrive, explanation of CP, etc. Do not include time spent in general conversation, completing the Information Specialist's form, or explaining the User's Reaction form.

14. "User present during entire search": check one category only. The user must be with the information specialist either in person or by telephone during the complete search from start to finish. If the user is present at the beginning of the search and leaves while citations are begin printed, do not count the user as "present during the entire search." If a search is performed on CHEMCON with the user present and later the search is performed on CHEM7071 without the user being present, do not count the user as present.

15. "Did user interaction take place during the search?": check one category only. If at any time during the search user interaction takes place for modification or confirmation purposes, check "yes". An example of a modification would be when the user sees or is told there are 1000 postings on his topic and he requests only those for the past year. An example of confirmation would be if the user sees the citation results of

a "PRT TRIAL" and agrees these are what he wants. If a user is present but only "sits" and does not interact for confirmation or modification purposes, then check "no".

16. "Did technical problems delay the on-line search?": check all that apply. Technical problems can be any mechanical malfunction affecting or delaying the search. If you are not sure what caused the trouble, check "other" and specify the difficulty. Do not include problems relating to search strategy. Examples of technical problems are: log-on problem TYMSHARE, log-on problem SDC, disconnect TYMSHARE, disconnect SDC, telephone problems including line noise, terminal malfunction, window change, "garbage" received, and host down (all ports busy, ORBIT not active, or other associated messages). TYMSHARE should be used in a broad sense and include problems associated with TELENET as well.

User's Reaction to On-Line Search Form

1. "The number of citations retrieved by this search was ____": the information specialist should fill in the appropriate information for this question. Only the total number of unique citations should be given: that is, if 10 citations on "mercury" were printed on-line and the same 10 are included in 100 citations on "toxicology" printed off-line, then the total number of citations printed is 100. If citations are printed both on-line and off-line, or only off-line, save the User's Reaction form until the off-line citations arrive, then attach and forward to the user who will complete questions 1a, 1b, 1c, 1d, 2, 3, 4 and 5. When the completed User's Reaction form is returned, attach it to the appropriate Information Specialist's Record of On-Line Use form for filing purposes. It is conceivable that no citations will be found. The user should still be asked to react to these "no hits".

Revised October 18, 1976

GUIDELINES FOR MTC'S INFORMATION SPECIALIST'S RECORD OF ON-LINE USE

The following discussion and definitions may be helpful in completing the Information Specialist's Record of On-Line Use form. It is suggested that the user information, search number, "Searched by," "Date searched," and "Pre-Search" section be completed prior to the on-line search and that the "Post-Search" section be completed immediately following the terminal search, while the print-out is still available. Each separate search topic requires an Information Specialist's form and a User's Reaction form. If you are not sure it is a separate search topic, ask the user.

Pre-Search Questions

1. "Search request received": check all that apply. The phrase "in writing" refers to formal correspondence, as well as a few keywords jotted down on scrap paper. The phrase "other than final user" refers to requests received by a third party, _e.g._, John Jones (group leader) requests a search to be given to and used by Bill Smith (bench chemist); Bill Smith will complete the User's Reaction to On-Line Search form.

2. "Relationship to previous searches": check one category only. A "new search" should be counted for each new topic that is not a "modification" or "continuation" of any previously conducted search. It is conceivable that more than one search will be received and conducted at one terminal session for more than one user. If you are not certain that it is a "new search" for the user present, ask the user.

Examples of a "continuation/update of previous search" are: (a) the search is performed on a different data base, _e.g._, the search topic was initially searched on CHEMCON, the user then returns and requests

that the same topic be searched on SSIE, or, a search is done on CHEMCON, the user then returns and requests the same search be "downdated" on CHEM7071; (b) a search is performed on CHEMCON, and a month later the user returns and requests that the same search be done for the last four weeks on CHEMCON, i.e., SDI service (selective dissemination of information).

A "modification of previous search" occurs when a new search strategy is adopted, additional keywords are employed, or other devices are used to change the approach to the topic which was previously searched. If you cross data bases during the same terminal session, count as one search (use one Information Specialist's form and one User's Reaction form) unless a different topic is searched. When crossing data bases, a certain amount of vocabulary change is necessary; however, count as a "continuation of previous search" unless based upon previous print-outs and/or user interaction, the search is so improved or changed that it must be counted as a "modification."

3. "Initial search request": check all that apply. An "initial search request" refers to the search request as it is presented to the information specialist by the user before any negotiation takes place.

The word "synonym" should be used in its broadest sense, e.g., NMR or nuclear magnetic resonance; transition metal, organometallic, or manganese would be considered synonyms. It should be emphasized that this box is to be checked only if the synonyms are supplied by the user, not if they are suggested by the information specialist or elicited from the user during the negotiation process.

The phrase "logic supplied by user" should be checked if the user provides the appropriate Boolean operators or their equivalent, i.e., the user has some knowledge of how a search strategy is formulated and provides

the logic for linking key concepts or keywords.

The phrase "constraints supplied by user" refers to those items suggested for inclusion, exclusion, or consideration by the user, not those items supplied by the information specialist or elicited from the user during the negotiation or searching process. Examples of constraints are: citations in the English language only (and not foreign); personal authors (Smith, F. Harry); types of publications to be included or excluded (patents, journals, books, technical reports, conference proceedings, dissertations); maximum number of citations (the 20 most recent; no more than 100); time period (last update code; last two years only). Some examples of "other restrictions" are: CA section numbers; sponsoring agency; article title; journal name; review articles; and other language restrictions (English and French).

4. "User's types of approaches and purposes for this search": check all that apply; it is not necessary to check one box in each of the broader categories "Types of Approaches" or "Purpose of Use."

A "current awareness" type of approach is the same as SDI (selective dissemination of information). A good example of this type of approach is an update, *e.g.*, the search statement -- ALL HYDROGEN# AND ALL BOND: AND 7615(UP) -- to be executed on CHEMCON. Since the information specialist initiates permanent SDI requests, consider these as received "by other than final user" (question 1). For each SDI request be sure to include time period constraint (question 3) on each Information Specialist's form. The user should react to each SDI update.

An "exhaustive" search implies a comprehensive, retrospective approach to a topic. In some cases the user requests only "a few references on [a] topic"; however, in many cases, the user's type of approach is to check through all relevant information existing on a topic (exhaustive) but he

receives only a few references on a topic instead. Check the box next to the phrase or word most closely corresponding to the user's approach, not the word or phrase which corresponds to what the user received.

"Browsing" takes place when the user attempts to see what the system can do or what there is on a given subject in the data base in a manner that is not as systematic as "exhaustive" or a "few references on topic"; for example, "lanthanides" as a broad subject which is further narrowed on-line to "cerium." A user looking for citations to documents pertaining to equipment set-up or maintenance would be using the "specific facts or procedures" type of approach.

A search dealing with only one topic may be considered as "Keeping current on: developments...." even though such a search is not "current awareness" on an SDI type basis. An example of "developments in own areas of competence" might be the topic nuclear magnetic resonance (NMR) and nitrogen - 15; whereas an example of "developments in related areas" might be the topic electron paramagnetic resonance (EPR or ESR) and nitrogen - 15. If you are in doubt as to "own" or "related" area of competence, ask the user.

In some cases a user might "brush up" on an earlier area of competence such as the topic statistics, or learn a "new specialty" such as the biochemical topic active transport needed by an inorganic chemist. This is apt to occur when a new project is started. Any topic related to "supporting work related to on-going projects" might be "theory" (diffusion), "facts" (boiling point of water), or "procedures, apparatus or methodology" (Van de Graaff accelerator). The category "patent application" should be interpreted broadly to include patent disclosures as well. Examples of "other" include testing the system, grant proposals, dissertations, technical reports, or papers for seminars, course requirements, or directed

individual study.

5. "Sources employed by user for searching this topic prior to seeking this on-line search": check all that apply. An example of "other" would be the use of print-out results from previous searches, *e.g.*, to obtain different or additional keywords or to devise a new search strategy.

Post-Search Questions

6. "Files searched": check all that apply, *e.g.*, more than one data base may be indicated. Examples of "other" include SSIE and NTIS.

7. "Number of search statements": the last SDC search statement with postings. If you restacked, erased all search statements, changed data bases, or in some other manner affected the SDC total number of search statements, please add the individual search statements together so that a total figure is given.

8. "Number of unique citations printed on-line": a hand count. "Unique" means not to count duplicate citations, *e.g.*, if 5 citations are printed by title only and then these same 5 are printed along with 4 others in a final listing of citations, count only 9 on-line citations, not 13. Citations printed on-line in abbreviated form (such as article title or "PRT TRIAL") do not have to be counted. Count only those containing sufficient information to locate the document.

Unless the user will be antagonized, the practice should be to repeat on-line citations in any off-line printouts. Two examples are as follows:

1) Jones, working with the information specialist, views three separate "PRT TRIAL" commands or a total of 6 records in narrowing his search. Ten citations are then printed on-line using the tailored print command "PRT 10 TI, AU, CP, SO, KW"; 100 citations (including the 10 printed on-line) are then printed off-line.

The number of unique citations printed on-line (question 8) is thus 10; the number of citations printed off-line is 100 (question 9); and the total number of citations retrieved (question 1, User's Reaction form) is also 100 (not 110 or 116).

2) Fisher, working with the information specialist, views 20 titles on-line and selects 5 to be printed using the "PRT" command; he wants the other 15 citations to be printed off-line but insists that the 5 he already has not be repeated. Fill in 5 on-line citations for question 8, 15 off-line citations for question 9, and a total of 20 citations retrieved on the User's Reaction form, question 1 (not 40 or 45).

9. "Number of citations printed off-line": the number of postings printed using the command "PRT OFFLINE..." In many cases, the off-line and on-line citations will contain duplicate document citations. These duplicates should be subtracted before completing question 1 on the User's Reaction form (see the example under 8 above). The SDC flat charge per citation encourages the use of "PRT FULL OFFLINE INDENTED" rather than the compact form where category names are abbreviated. Since this print command provides full information for the end-user, and also helps the information specialist by providing keywords for improving the search, it should be used whenever possible.

10. "Connect time in minutes": the number of minutes given when the command "TIME INTERVAL" or "TIME RESET" is used. If you forget to record this information during the initial search, the time given on the monthly SDC invoice may be used.

11. "User present during entire search": check one category only. The user must be with the information specialist either in person or by telephone during the complete search from start to finish. If the user

is present at the beginning of the search and leaves while citations are being printed, do not count the user as "present during the entire search." If a search is performed on CHEMCON with the user present and later the search is performed on CHEM7Ø71 without the user being present, do not count the user as present.

12. "Did user interaction take place during the search?": check one category only. If at any time during the search user interaction takes place for modification or confirmation purposes, check "yes". An example of a modification would be when the user sees or is told there are 1000 postings on his topic and he requests only those for the past year. An example of confirmation would be if the user sees the citation results of a "PRT TRIAL" and agrees these are what he wants. If a user is present but only "sits" and does not interact for confirmation or modification purposes, then check "no".

13. "Did technical problems delay the on-line search?": check all that apply. Technical problems can be any mechanical malfunction affecting or delaying the search. If you are not sure what caused the trouble, check "other" and specify the difficulty. Do not include problems relating to search strategy. Examples of technical problems are: log-on problem TYMSHARE, log-on problem SDC, disconnect TYMSHARE, disconnect SDC, telephone problems including line noise, terminal malfunction, window change, "garbage" received, and host down (all ports busy, ORBIT not active, or other associated messages). TYMSHARE should be used in a broad sense and include problems associated with TELENET as well.

User's Reaction to On-Line Search Form

1. "The number of citations retrieved by this search was ____": the information specialist should fill in the appropriate information

for this question. Only the total number of unique citations should be given; that is, if 10 citations on "mercury" were printed on-line and the same 10 are included in 100 citations on "toxicology" printed off-line, then the total number of citations printed is 100. If citations are printed both on-line and off-line, or only off-line, save the User's Reaction form until the off-line citations arrive, then attach and forward to the user who will complete questions 1a, 1b, 1c, 1d, 2, 3, 4 and 5. When the completed User's Reaction form is returned, attach it to the appropriate Information Specialist's Record of On-Line Use form for filing purposes. It is conceivable that no citations will be found. The user should still be asked to react to these "no hits".

Revised October 18, 1976

USER DEMOGRAPHIC DATA

During project phases II and III, demographic data on new users to the service were obtained by interviewing each user during his or her first visit. The interview questions were intended to provide primary information for later analysis and the responses were noted on a card file.

The interview questions consisted of the following:

Name

Status (faculty, research associate, graduate, etc.)

Sex

Highest educational level (BA, MA, etc.)

Year in which highest degree was obtained

Major field of highest degree

Length of time at FSU

Present position at FSU

Name of major professor (for graduate students)

If ever previously used an online search system

On-Line Search Project

Monthly Searches
By Type of User
FSU Chemists

TYPE OF USER	NUMBER OF UNIQUE USERS			NUMBER OF SEARCHES		
	New Users	Previous Users	Total Unique Users	Searches for New Users	Searches for Previous Users	Total Searches for All Users
Faculty Members						
Research Assoc./ Post Doctoral Fellows						
Doctoral Students						
Total All Sample Users						
Non-Sample Users						
Total All Users						

______ Total Number of Working Days

______ Average Number of All Unique Users/Working Day

______ Average Number of All Searches/Working Day

SEARCHING CHEMICAL LITERATURE BY COMPUTER

How You Can Get More From Your Computer-aided Search

Whatever subject you want to find through the computer search service, you can get more information and get it faster if you can describe the terms you want and how they are linked together. Here's how to do this.

TERMS

If possible before you come to the Search Service office, write out the names of the compounds, chemicals, reactions, processes, author names or other subjects you are looking for. This will make it easier to explain your search to the information specialist. Be sure to include any other words that have the same meaning as the specific one you want, plus any abbreviations or chemical symbols (but not formulas).

For example, a search for iron compounds should include the terms "Iron" and "Fe" and possibly "Ferrous." The more terms you have, the wider the scope of the search. To help you, the information specialist has lists of terms that are used for indexing, and can also check for possible misspelled index terms that might have been used.

SEARCH LOGIC

Try to put together the terms in the logical way you want them combined. For example, if you want all the references on "reactions involving sodium and chlorine," ask yourself if you want reactions involving sodium <u>along with</u> chlorine, or reactions with sodium and, <u>in addition but separately</u>, reactions with chlorine.

The logic used by the computer system is called Boolean logic. This uses the logical connectors AND, OR and AND NOT. They are illustrated by the following:

A <u>AND</u> B   A <u>OR</u> B   A <u>AND NOT</u> B

(The shaded portion shows which citations will be retrieved by the computer.)

The connector AND says that <u>both</u> terms A and B must be used to index the citation before it will print out. AND is the restrictive or limiting connector. In the example above, the search would be written as: REACTION AND SODIUM AND CHLORINE. All three terms must be in the citation for it to print out. This search gives all citations that involve <u>both</u> chemicals.

If you wanted each chemical separately, two search statements would be used: REACTION AND SODIUM; REACTION AND CHLORINE.

The OR connector gives the broadest scope and picks up any citation that includes Term A or Term B. For example, REACTION AND SODIUM OR REACTION AND CHLORINE will pick up all citations that have either chemical.

In some searches, there will be overlapping terms, with only one aspect that distinguishes the citations you want from those you don't. In these cases, the logic can be Term A AND NOT Term B. If there were two possible reactions with the two chemicals, you could specify Reaction (type 1) AND Sodium AND NOT Reaction (type 2).

LIMITING SEARCHES

If you anticipate that your search will find many citations, you may want to limit the number by restricting your search in one of several ways. You may search only from a certain year to the present, e.g., "since 1975." Or you may want to find only review articles. Or you may want only those references in the English language. Just tell the information specialist what limits you want.

AUTHOR SEARCHING

You can also search for citations by specific authors. It is helpful if you can write down the exact spelling of the author's first name (or initials) and last name, and indicate any different ways you have seen that author cited. For example, James A. Smith may be cited as: SMITH J. SMITH JAMES A. SMITH J.A.

OTHER DATABASES

In addition to chemical databases, we can also search ones that cover related fields including biology (and biochemistry), engineering (and chemical engineering) and geology.

Prepared by the Online Search Service Research Project, Chemistry Bldg. Rm. 105.

October 1977

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/login sdcfsu33
YOU ARE ON LINE L99

HELLO FROM SDC/ORBIT.  (11/28/77  8:18 A.M.  PACIFIC TIME)
YOU ARE NOW CONNECTED TO THE ORBIT DATABASE.

ENTER SECURITY CODE:
[redacted]

PROG:
ARE YOU A NEW USER?  IF YES ENTER Y.  IF NO ENTER N OR A COMMAND.

USER:
"file chemcon"

PROG:
ELAPSED TIME ON ORBIT: 0.01 HRS.
YOU ARE NOW CONNECTED TO THE CHEMCON DATABASE.
ACS COPYRIGHT.

PROG:

SS 1 /C?
USER:
xanthine and all dehydrogenase# or all xanthinedehydrogenase# or xdh

PROG:
SS 1 PSTG (103)

SS 2 /C?
USER:
1 and not all fisher j: (au)

PROG:
SS 2 PSTG (93)

SS 3 /C?
USER:
2 and liver or 2 and all hepat:

PROG:
SS 3 PSTG (35)

SS 4 /C?
USER:
3 and not rat

PROG:
SS 4 PSTG (31)

SS 5 /C?
USER:
4 and from 75 thru 77
```

PROG:
SS 5 PSTG (15)

SS 6 /C?
USER:
"P full"

PROG:

-1-
AN - CA08715113876E
TI - OXIDATION-REDUCTION POTENTIALS OF TURKEY LIVER XANTHINE DEHYDROGENASE AND THE ORIGINS OF OXIDASE AND DEHYDROGENASE BEHAVIOR IN MOLYBDENUM-CONTAINING HYDROXYLASES
AU - BARBER, MICHAEL J.; BRAY, ROBERT C.; CAMMACK, RICHARD; COUGHLAN, MICHAEL P.
OS - SCH. MOL. SCI., UNIV. SUSSEX, BRIGHTON
LO - ENGL.
SO - BIOCHEM. J. 163 2 279-89
JC - BIJOAK
PY - 77
DT - J
LA - ENG
CC - CA007013
IT - XANTHINE DEHYDROGENASE LIVER REDOX POTENTIAL

SS 6 /C?
USER:
"stop"

PROG:
DONE? (Y/N)

USER:
y

PROG:
TERMINAL SESSION FINISHED 11/28/77 8:24 A.M. (PACIFIC TIME)
ELAPSED TIME ON CHEMCON: 0.11 HRS.
TOTAL ELAPSED TIME: 0.11 HRS.

PLEASE HANG UP YOUR TELEPHONE NOW. GOOD-BYE!

School of Library Science

The Florida State University
Tallahassee, Florida 32306

MEMORANDUM

TO: Participants in On-Line Search Project

FROM: Gery Jahoda and Al Bayer

Gery Jahoda Al Bayer

SUBJECT: On-Line Searches

Beginning Friday, May 28, 1976 we will be offering free on-line search services to you in Chemistry Research Building Room 105. Marcia Myers and Sharon Selman will do searches for you during the following hours for the remainder of quarter III:

Mondays thru Fridays	9:00a.m. - 1:00p.m.
Monday and Thursday evenings	6:00p.m. - 9:00p.m.
Tuesday and Wednesday afternoons	1:00p.m. - 3:00p.m.

Based upon user needs, new, mutually agreeable, hours can be arranged for the summer. To have searches made either stop by Room 105 or give Marcia or Sharon a call at 644-5033.

Although some may not be appropriate to your information needs, the following System Development Corporation data bases will be available to you:

CHEMCON and CHEM7071. Topics covered are those found in Chemical Abstracts Condensates, prepared by Chemical Abstracts Service. CHEMCON includes materials from 1972 to date; CHEM7071 covers 1970 to 1971. CHEMCON has over 1.3 million records; CHEM7071 has over 580,000 records. About 12,000 records are added to CHEMCON weekly.

CAIN. Cataloging and Indexing data base, prepared by National Agricultural Library. Covers world-wide journal and monographic literature in agriculture and related subject fields, including general agricultural and rural sociology; economics; consumer protection and human nutrition; animal science; veterinary medicine; forestry and plant-related areas; chemistry; natural resources, entomology; and agricultural engineering. Includes materials from 1970 to date--over 692,000 items. About 12,000 records added monthly.

CIS INDEX. Prepared by Congressional Information Service. Covers U.S. Congress publications: hearings; committee prints; House and Senate Reports, Documents, and special publications; Senate Executive Reports and Documents. Subject coverage is multi-disciplinary and topical. Includes materials from 1970 to date--over 50,000 items. About 900 records added monthly.

COMPENDEX. Prepared by Engineering Index. Corresponds to Engineering Index Monthly. Covers civil-environmental-geological engineering; mining-metals-petroleum-fuel engineering; mechanical-automotive-nuclear-aerospace engineering; electrical-electronics-control engineering; chemical agricultural-food engineering; and industrial engineering, management, mathematics, physics, and instruments. Includes material from 1970 to date--over 425,000 items. About 6,000 records added monthly.

ERIC. Prepared by the National Institute of Education. Covers report and periodical literature in many education and education-related areas: educational management; higher education; information resources; science; mathematics and environmental education; teacher education; tests, measurement, and evaluation, and others. Includes material from 1966 to date--over 220,000 items. About 2,500 records added monthly.

GEOREF. Geological References file, prepared by the American Geological Institute. Covers geosciences literature from 3,000 journals, plus conferences and major symposia and monographs, in such areas as engineering-environment geology, geochemistry, geomorphology, hydrogeology, igneous and metamorphic petrology, mineralogy, oceanography, paleobotany, sedimentary petrology, soils, stratigraphy, and structural geology. Includes materials from 1967 to date--over 263,000 items. About 3,000 records added monthly.

LIBCON/E and LIBCON/F and LIBCON/S. Prepared by Information Dynamics Corporation. Covers all subject areas in monographic literature and audio-visual materials, and includes MARC records from the Library of Congress as well as many more LC-cataloged items. Three different data bases are available. LIBCON/E, for English language materials; LIBCON/F, for non-English language materials; and LIBCON/S, for current materials. Includes materials from 1965 to date, but many publications pre-date the 20th Century--over 1 million records. About 7,000 records added weekly.

INFORM. Prepared by ABI, a division of Data Courier, Inc. Covers business management periodical literature from over 300 journals, in the areas of finance, management, economics, statistics, business law, and marketing. Journals such as Duns Review, Harvard Business Review, and Nations' Business are abstracted. Includes materials from 1971--over 32,000 items. About 1,200 records added monthly.

NTIS. Prepared by National Technical Information Service (NTIS) of the U.S. Department of Commerce. Is a broad and cross-disciplinary file containing citations and abstracts of government-sponsored R&D reports and other government analyses prepared by Federal agencies or their contractors and grantees. Corresponds to the Weekly Government Abstracts and the semi-monthly Government Reports Announcements. Includes materials from 1970--over 314,000 items. About 2,300 records added biweekly.

P/E NEWS. Prepared by Central Abstracting Indexing Service of the American Petroleum Institute. Covers five major publications in the petroleum and energy fields: Platts Oilgram News Service, Middle East Economics Survey, Petroleum Intelligency Weekly, Petroleum Economist, and Oil Daily. Includes materials from 1975 to date--over 23,000 items. About 500 records added weekly.

POLLUTION. Prepared by Pollution Abstracts, a division of Data Courier, Inc., and corresponds in coverage to the printed POLLUTION ABSTRACTS publication. Covers foreign and domestic reports, journals, contracts and patents, symposia, and government documents in the areas of pollution control and research: water, marine, land, and thermal pollution; pesticides; sewage and waste treatments; and legal developments. Includes materials from 1970 to date--over 37,700 items. About 1,000 records added bimonthly.

SSIE. Prepared by the Smithsonian Science Information Exchange. Covers on-going and recently completed research in the life, physical and social sciences--both basic and applied research projects. Research in progress is included from over 1,300 funding organizations, such as federal, state, and local government; non-profit associations; colleges and universities; non-affiliated investigators; and some foreign organizations and private industry. Includes materials from Fiscal Year 1974 to date--over 130,000 items. About 9,000 research projects and continuations added monthly.

We plan to start service with a teleprinter (T33), pending arrival of the faster (30 characters/second) non-impact NCR printer. You are invited to stop by Room 105, whether or not you want a search conducted.

Monsanto

FROM (NAME & LOCATION) Paul W. Gann - Pensacola

DATE January 20, 1976

SUBJECT Computerized Searching Technical Literature - FREE

REFERENCE

TO :

The Technical Library - Pensacola has completed arrangements which, for 1976, gives you free on-line searching of the SDC computerized data bases. This means that a large segment of the world's technical literature is literally at your finger tips.

Here is a unique opportunity for you to:

1. Back-up or strengthen your project work with literature searches designed to your specific requirements.

2. Evaluate the usefulness of these data bases and the computerized approach to searching technical literature.

The scientific and patent literature data bases available include:

Chemical Abstracts
Engineering Index
Government sponsored R&D from National Technical Information Service
Pollution and Environment, based on Pollution Abstracts
Derwent - World Patent Abstracts

*There are 10 or more non-scientific data bases including ones covering marketing information which are also available.

The reason for the free use of these computerized files is that we are participating in a National Science Foundation sponsored study. This study, which is directed by the Florida State University - School of Library Science, is designed to obtain an understanding of the effect of the availability of on-line search bibliographic data bases (OLBD) on its intended users information style. The experience gained during the study and the results of the study will be valuable to all of us.

In order to participate, you will need to complete the attached questionnaire (for background information) and return it to me for forwarding to my FSU contact. The precise search subjects, resulting hits and names of participating individuals are confidential to Monsanto. Your name is coded for this purpose (see Monsanto survey code number on the 1st. page of questionnaire). I will act as the MTC co-ordinator for the study.

*Complete list attached.

The number of searches covered by this study is limited by available program money, but should be sufficient to handle the bulk of our needs. Costs beyond this will be handled as regular library search requests and charged to your cost center. You are requested to participate in the program and, hopefully, will make multiple or reasonably extensive use of this computerized approach to literature searching during this year. (Please use the search request form, copy attached, when requesting a search).

If you do not care to participate in the NSF study, I would appreciate your completing the form and adding a notation "not interested in NSF study". You can always change your mind at a later date. Note: Most searches cost $15-50 depending upon the complexity of the search and the number of citations printed. You can avoid this cost for 1976 by participating in the study.

Call me at ext. 7500 (Pensacola) if there are questions.

Paul W. Gann

Paul W. Gann
Technical Library - Pensacola

PWG:cb

P.S. Do not concern yourself with the mechanics of the search. Messrs Gann and Reynard will handle this although we encourage your presence during the on-line search. If you are so inclined, you can learn these mechanics in relatively short order and handle the searches yourself.

SDC DATA BASES

DATA BASE NAME	SUBJECT MATTER AND SOURCE	ENTRY-YEAR COVERAGE FROM[1]	NO. OF CITATIONS THRU 1974
*APILIT	Petroleum literature, from American Petroleum Institute	JAN 1964	169,000
*APIPAT	Petroleum patents, from American Petroleum Institute	JAN 1964	86,000
*ASI	Government statistical publications, based on American Statistics Index	JAN 1974	20,000
CAIN	Agriculture and related areas, from National Agricultural Library	JAN 1970	605,000
CHEMCON	Chemistry, from Chemical Abstracts Service	JAN 1972	988,000
CHEM7Ø71	Chemistry, from Chemical Abstracts Service	JAN 1970	600,000
*CIS	Publications of the U.S. Congress, based on the Congressional Information Service Index	JAN 1970	55,000
COMPENDEX	Engineering, from Engineering Index	JAN 1970	358,000
ERIC	Education, from National Institute of Education	JAN 1966	192,000
*GEO-REF	Geosciences, from American Geological Institute	JAN 1967	239,000
*IDC/LIBCON	Library of Congress cataloging, from Information Dynamics Corp.	JAN 1965	837,000
INFORM	Business Management, from ABI Inc.	AUG 1971	23,000
*MATRIX	Communications, Ecology, and Urban Planning, from ORBA Information Ltd.	MAY 1973	15,000
NTIS	Government-sponsored R&D reports, from National Technical Information Service	JAN 1970	265,000
*P/E NEWS	Business news in petroleum and energy, from American Petroleum Institute	JAN 1975	--
*POLLUTION	Pollution and environment, based on Pollution Abstracts	JAN 1970	35,000
*SCISEARCH®	Life sciences, from Institute for Scientific Information	APR 1972	546,000
*SEARCH	Chemical marketing information, from International Business Data, Inc.	JUL 1972	45,000
*SSIE	Research in progress, from Smithsonian Science Information Exchange	FISCAL YR 1974	110,000

*Available *exclusively* through SDC Search Service.

Footnotes:

[1] Dates represent years in which materials were entered into the files by the data base suppliers. Actual publication-year coverage is frequently broader.

ALSO: WI DERWENT WORLD PATENT ABSTRACTS JAN '75

COMPUTERIZED LITERATURE SEARCH

Date ______________

FROM: ______________

Subject ______________

____

Search No. ______ Charge ______ File ______

Description: ______________

Terms:

M E M O R A N D U M

DATE: October 10, 1977

TO: Chemistry Department Faculty and Graduate Students

FROM: Al Bayer, Dept. of Sociology, and Gery Jahoda, School of Library Science

RE: Resumption of On-Line Search Service

We are pleased to announce that the computer search service of chemistry-related data bases will again be available in the Chemistry Department during the coming academic year. The search service will reopen on Wednesday, October 12.

This service allows you to rapidly search Chemical Abstracts and similar indexes to locate citations on topics you are interested in for your teaching, research or studies. The benefits are many. You can:

* save many hours of manual searching through indexes
* have bibliographies produced that are tailored to your needs
* interact with the computer system to refine your inquiry
* discover what work has been previously done on a topic, or locate topics about which little has been written
* keep aware of the latest writings in your field.

The information specialists during the coming year will be Jan Fennell, Bonnie Jackson and Bill Needham. Service hours will be:

Monday	- 9:30 - 3:00
Tuesday	- 9:30 - 3:00
Wednesday	- 9:30 - 3:00
Thursday	- 9:30 - 12:30
Friday	- 9:30 - 3:00

Those of you already familiar with this service are aware that this is part of a National Science Foundation-sponsored grant to study how and with what effect on-line search services are used. The service this year will also be supported in part by the Chemistry Department through charges to research grants. An advisory committee of department faculty has been established to assist in the planning and evaluation of the search service. The committee will also consider the feasibility of offering on-line search services through the Chemistry Department when NSF funds expire.

New data bases have become available during the summer and improved system design should make your searches more effective. Over 50 data bases are available but the ones of most interest to you are described in the attachment to this memo.

For those of you who are not familiar with the service, on-line bibliographic searching is one of the rapidly expanding methods of doing literature searching. The procedure is simple. Come to Room 105, Chemistry Research Building (next to the elevators) with your request. An information specialist will discuss your request with you

to clarify your terms, suggest synonyms, and find ways of locating all the material you want. You are encouraged to remain while the search is being made so that you can interact with the responses from the data base to make the results more precise. If you do not wish to remain, you may leave your request with the specialist and the results will be placed in your mailbox.

The typical search takes about 15 minutes. You may obtain the citations immediately if they are not too numerous. If there are many citations (more than about 20), it is less costly if we can request that they be printed off-line and mailed to us. This usually takes only 3 to 5 days. There is no limit to the number of citations that may be printed off-line.

Because this service is part of an experimental study, you will be given a short reaction form and asked to comment on the usefulness of the service. Your feedback will help us provide better service and will give us data for our research.

We look forward to seeing you and providing this service to help you in your research and studies.

AB/GJ/jw

SELECTED DATA BASES AVAILABLE FOR ON-LINE SEARCHING

<u>CHEMCON</u> and <u>CHEM7071</u>: These are the two basic data bases which cover literature found in <u>Chemical Abstracts</u>. Coverage is from 12,000 journals, patents from 26 countries, new books, conference proceedings, and government research reports. The data bases contain the citations only, not the abstracts. CHEMCON includes over 1.5 million citations from 1972 to the present and is current within about two weeks. About 12,000 new records are added to the file every two weeks. CHEM7071 has about 600,000 records and covers the years 1970 and 1971, with a few entries that date back to 1969. (Unfortunately, there are no files yet that go back to earlier years.)

<u>BIOSIS PREVIEWS</u>: This data base is the authoritative secondary source for the entire life sciences, with citations from about 8,000 journals. The total number of entries is about one million, from 1972 to date.

<u>COMPENDEX</u>: This is an engineering-oriented data base, prepared by Engineering Index and corresponding to <u>Engineering Index Monthly</u>. Topics include all aspects of engineering: chemical, civil, environmental, geological, metals, petroleum, nuclear, electrical and others. Entries are from 1970 to date, with a total file of over half a million citations.

<u>GEOREF</u>: This is the file of geology and earth sciences, and covers literature from 3,000 journals, plus conference proceedings, monographs, and major symposia. Topics include geology, geochemistry, mineralogy, paleobotany, soils, and oceanography. Coverage is from 1967 to date, with about 3,000 records added monthly.

<u>SSIE</u>: These data, prepared by the Smithsonian Science Information Exchange, covers on-going and recently completed research in the life, physical and social sciences, both basic and applied. Research in progress is included from over 1,300 funding agencies: colleges and universities, government, non-profit associations, and others. The file has material from mid-1974 and about 9.000 research projects and continuations are added monthly.

<u>GRANTS</u>: This file is a complete source of references to more than 1,500 grant programs offered by Federal, state and local governments, commercial organizations, and associations and private foundations. It covers 88 disciplines, including the sciences.

ANALYSIS OF USAGE GRAPHS

A study of the pattern of searches at the two test sites does not suggest predictability of usage except for the early stages of service. At both FSU and Monsanto, and at FSU for phases I and II, the early months of service show the following pattern:

** An "initial interest surge," with a very high number of searches in the first month, caused in part by curiosity of potential users.

** A marked decline in use in the following one or two months, presumably as curiosity is satisfied and immediate search needs are fulfilled.

** An increase in search requests but to a much lower level than in the first month or two.

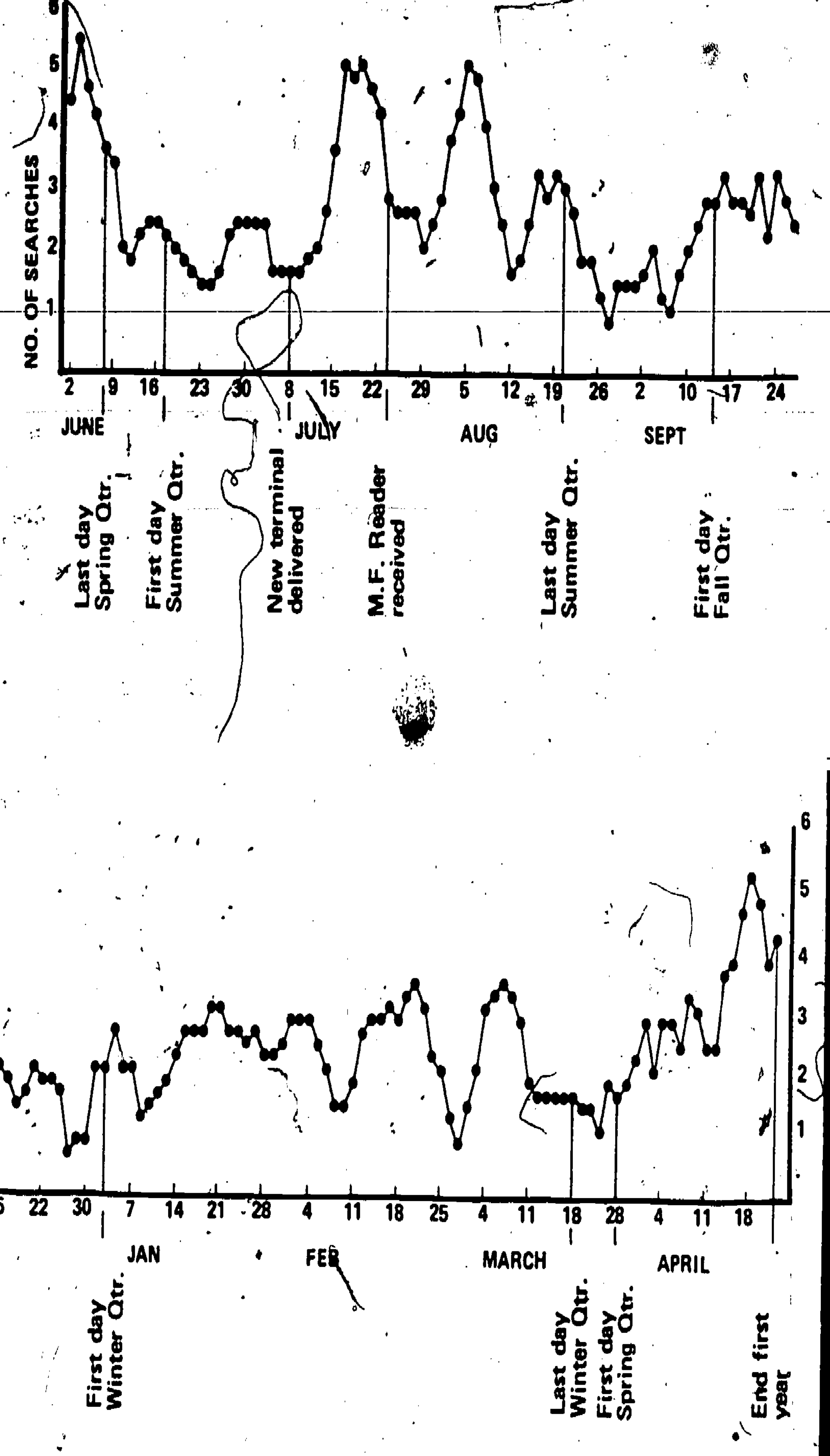
Beyond the initial three to four months of service, the usage pattern is influenced by factors inherent in each test site, such as academic calendar (quarter breaks), examination periods, vacation times, start-up or completion of major projects, etc.

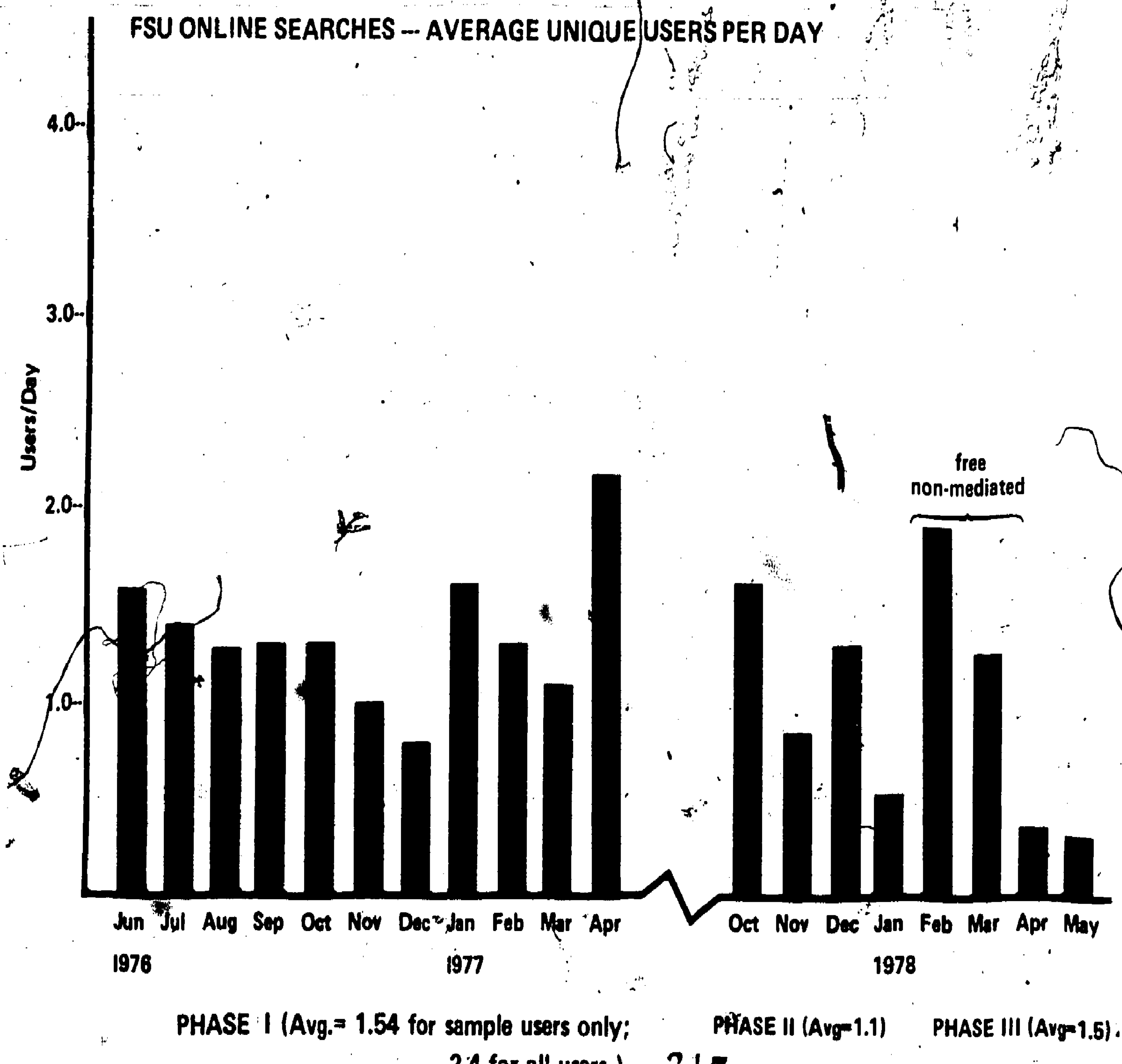
A close look at usage was made with a chart of five-day weighted average of number of searches per day for the entire project period. Relating number of searches to various critical events -- notably the introduction of new equipment and special efforts at publicity of the service -- showed no positive relationship between these events and increased usage.

1978

ONLINE SEARCHES AT F.S.U. PHASE 1

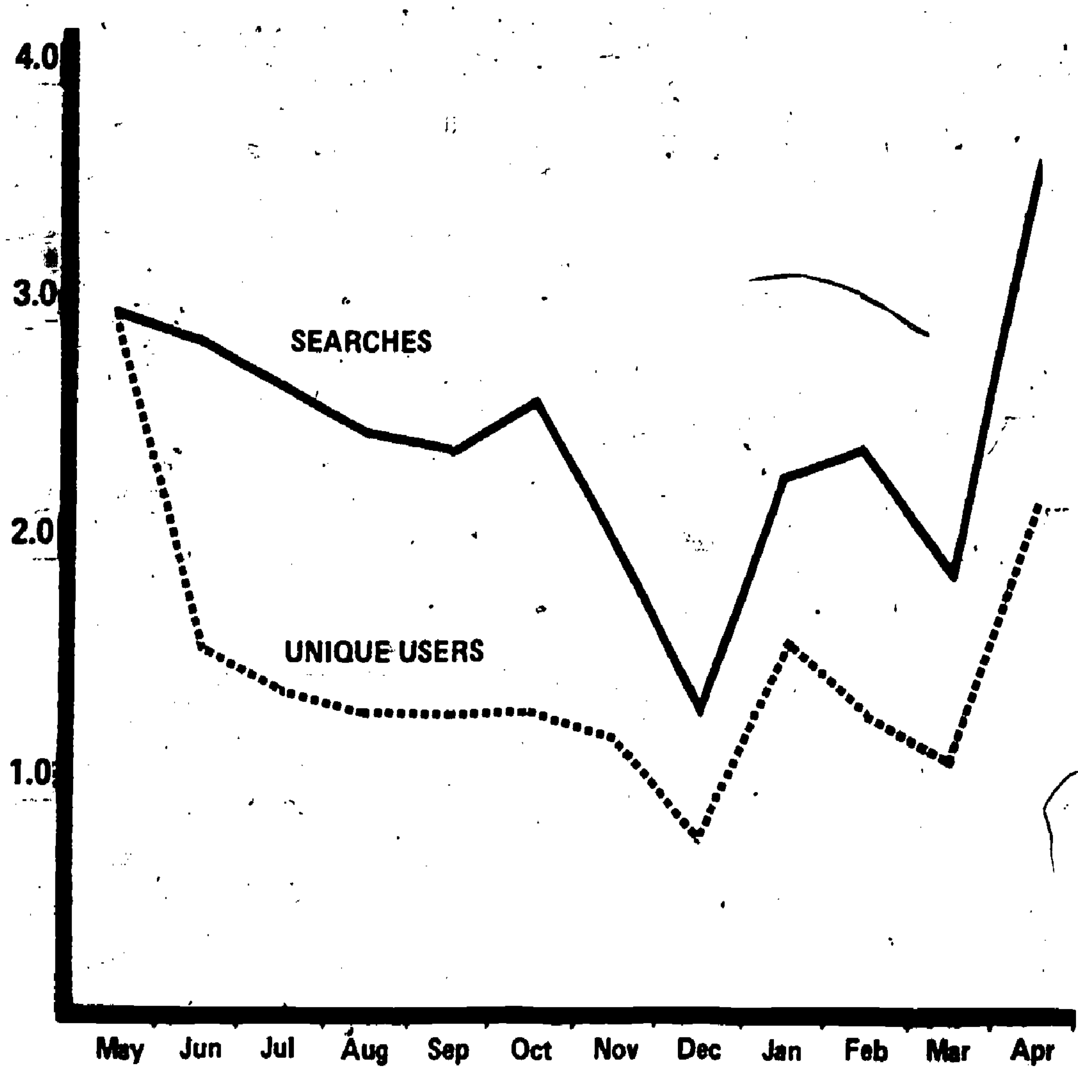
Five day weighted averages

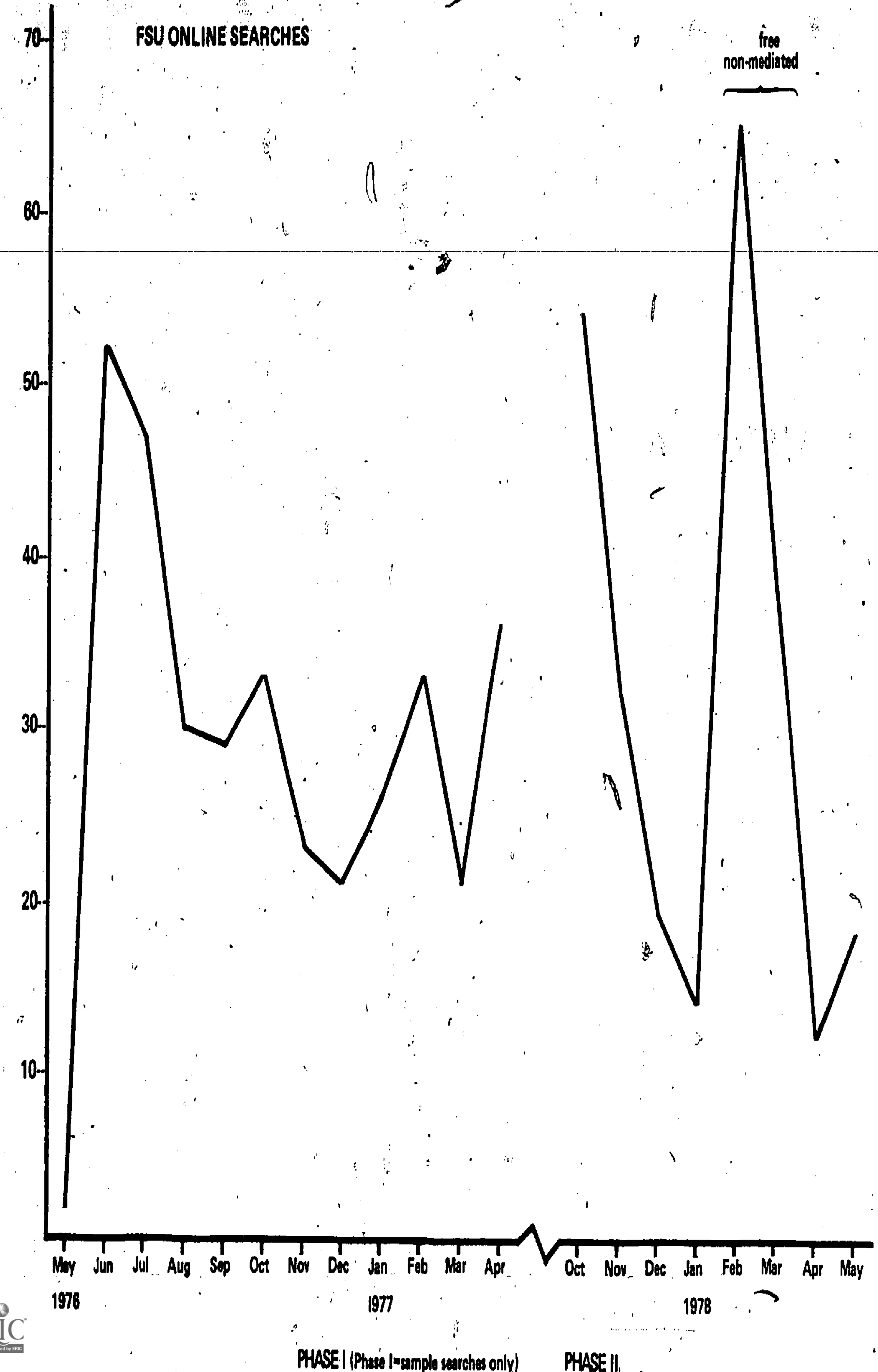



FSU ONLINE SEARCHES -- AVERAGE UNIQUE USERS PER DAY
Users/Day
4.0
3.0
2.0
1.0
free
non-mediated
Jun Jul Aug Sep Oct Nov Dec Jan Feb Mar Apr
Oct Nov Dec Jan Feb Mar Apr May
1976
1977
1978
PHASE I (Avg.= 1.54 for sample users only; 2.4 for all users.)
PHASE II (Avg=1.1)
PHASE III (Avg=1.5)

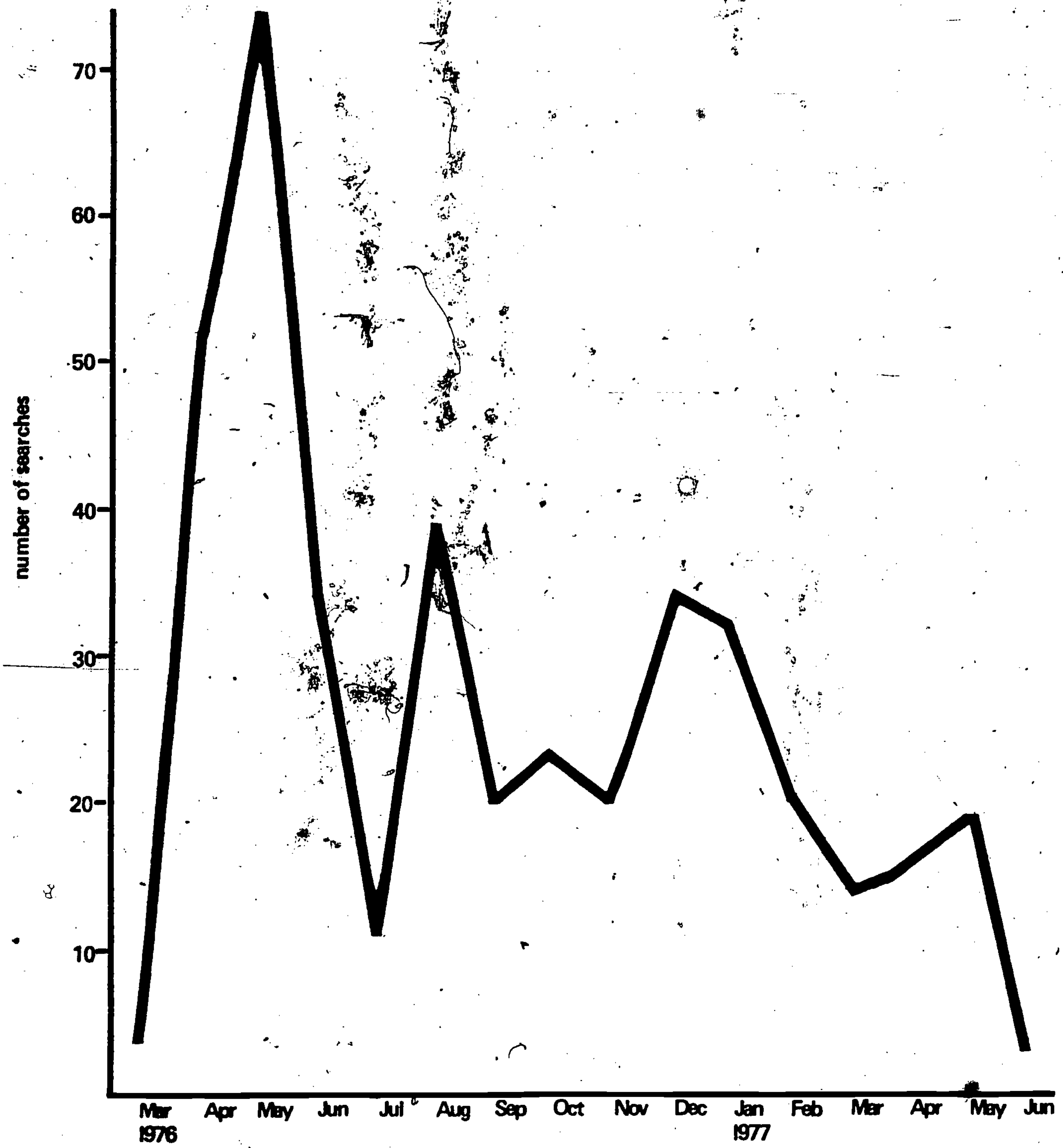
317

AVERAGE DAILY USE—FSU (Phase I)

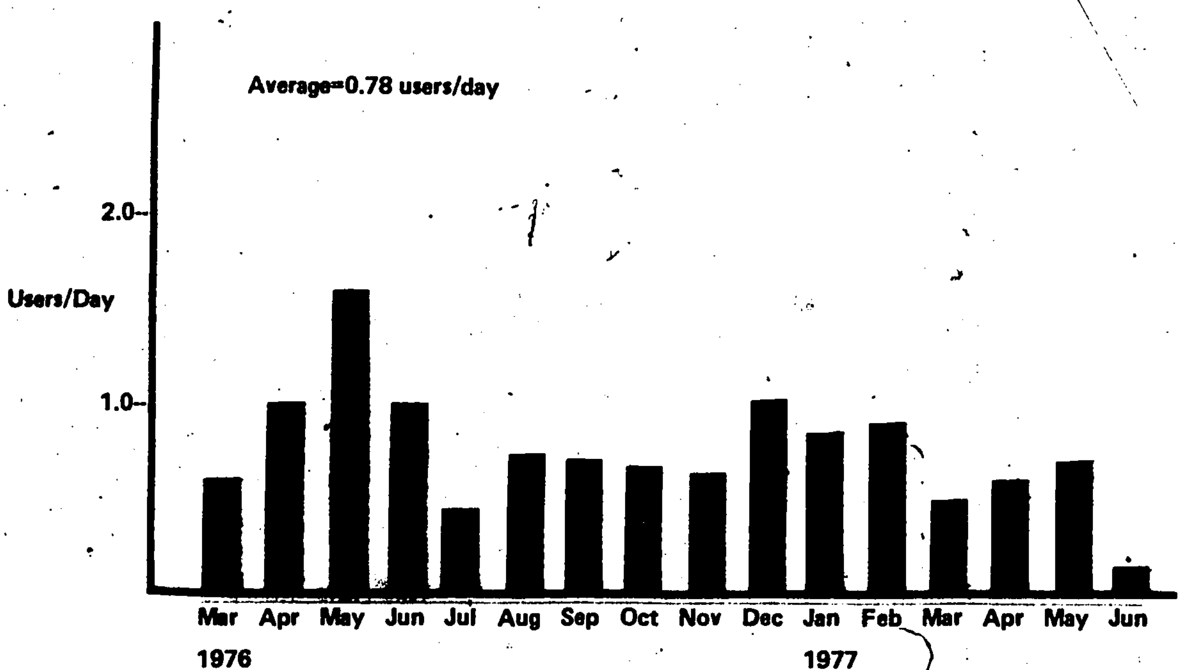



FSU ONLINE SEARCHES
free
non-mediated
number of searches
70
60
50
40
30
20
10
May
Jun
Jul
Aug
Sep
Oct
Nov
Dec
Jan
Feb
Mar
Apr
Oct
Nov
Dec
Jan
Feb
Mar
Apr
May
1976
1977
1978
PHASE I (Phase I=sample searches only)
PHASE II

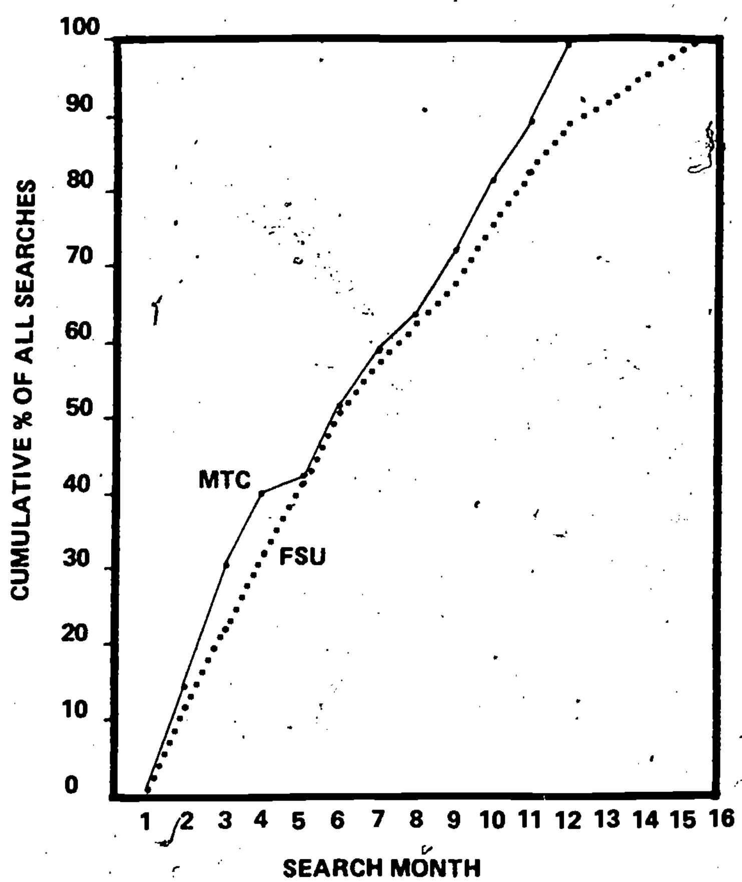
ONLINE SEARCHES — MONSANTO
based on returned feedback forms; includes sample and non-sample



MTC ONLINE SEARCHES — AVERAGE UNIQUE USERS PER DAY



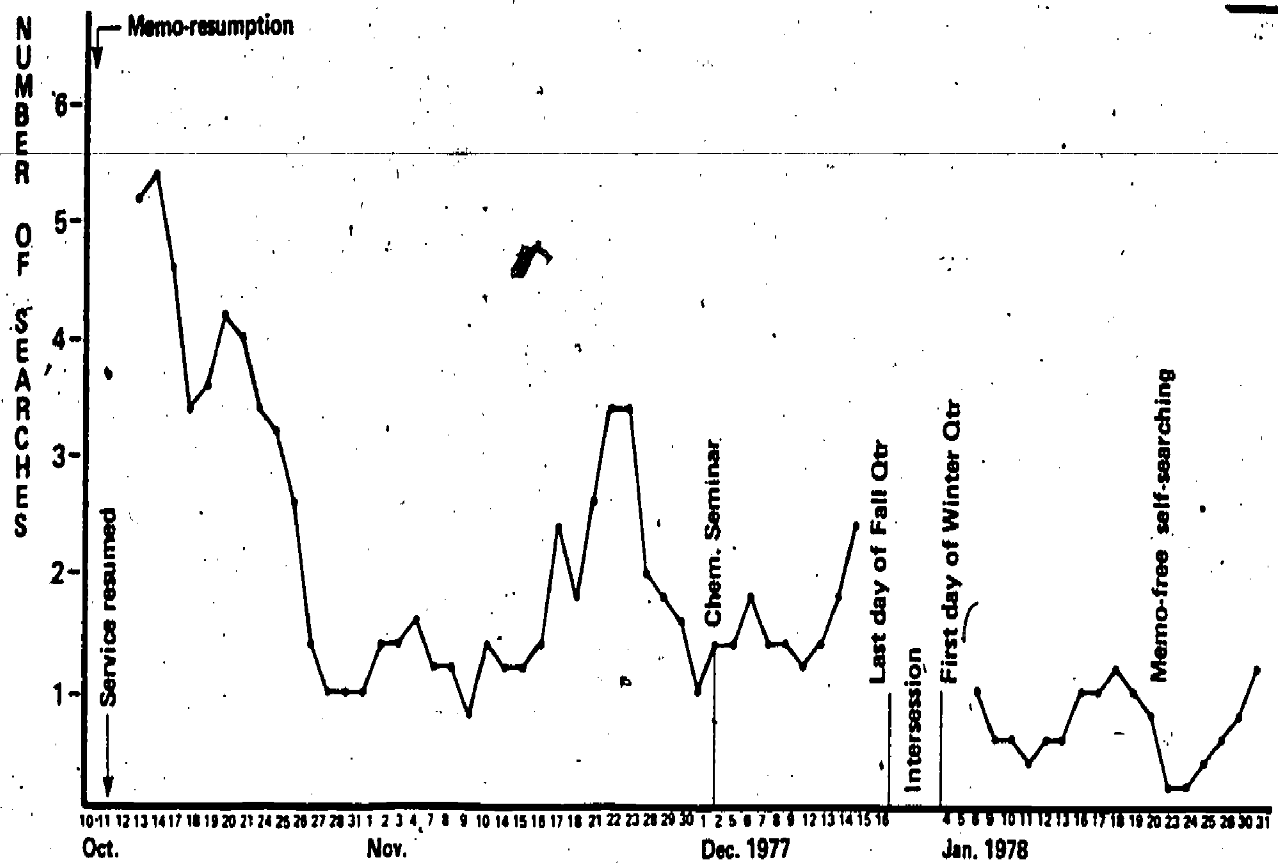
RATE OF SEARCHING—Phase I
FSU vs. MTC

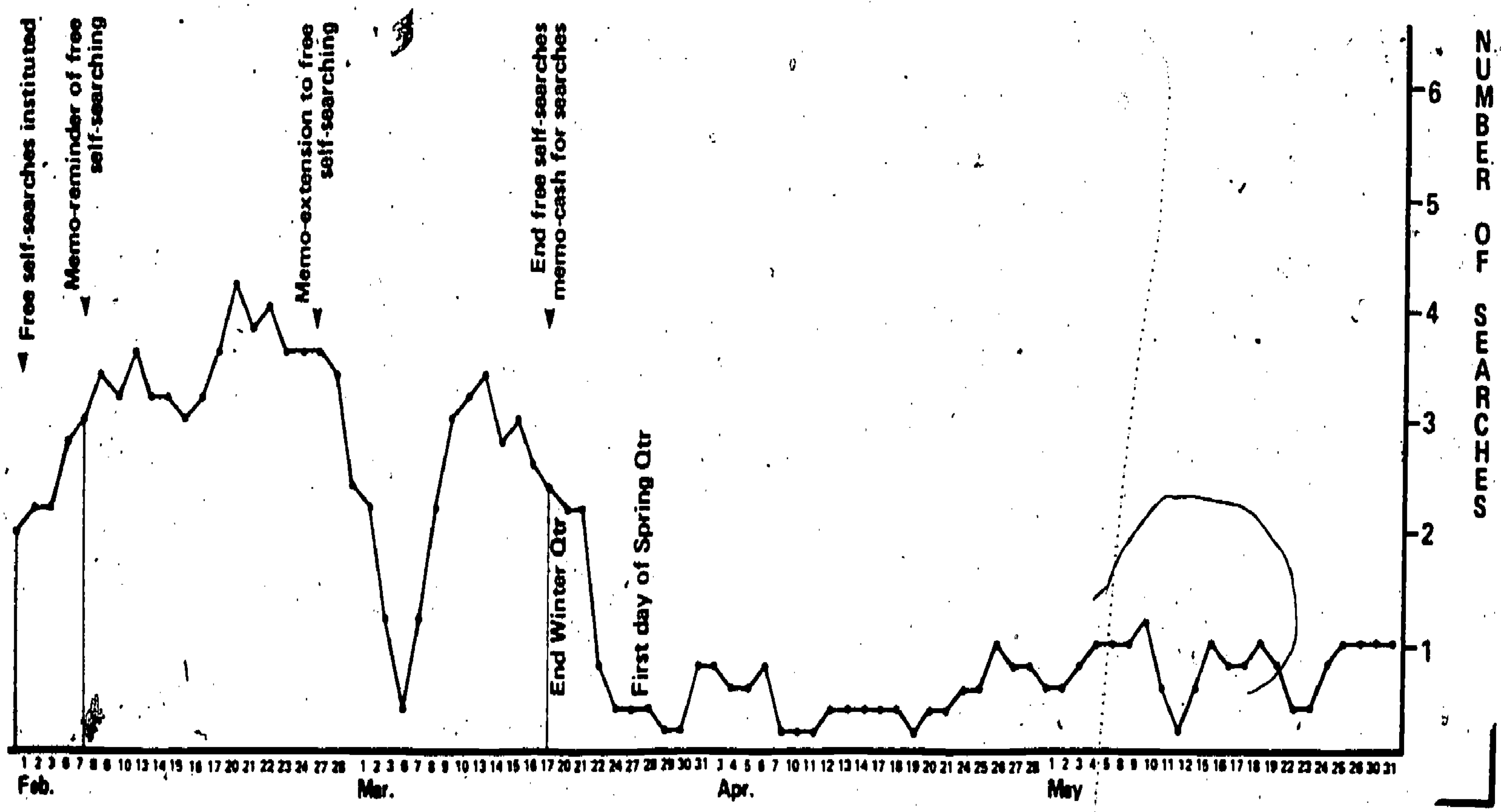


ONLINE SEARCHES AT FSU

PHASES II AND III

Five-day weighted averages





PROJECT PUBLICATIONS

Bayer, Alan E. and Gerald Jahoda, "Background Characteristics of Industrial and Academic Users and Nonusers of Online Bibliographic Search Services," On-line Review, 3(no.1, 1979):95-105.

Bayer, Alan E. and Gerald Jahoda, "The Effects of Online Bibliographic Searching on Scientists' Information Style," submitted to the Journal of the American Society of Information Science, February, 1979.

Gann, Paul W., "On-line Searching at Monsanto Textiles Company," Presentation to Technical Information Users Council meeting, April 28, 1977, Raleigh, North Carolina.

Jahoda, Gerald, Alan E. Bayer and William L. Needham, "A Comparison of Online Bibliographic Searches in One Academic and One Industrial Organization," RQ 18(Fall, 1978):42-49.

Jahoda, Gerald and Alan E. Bayer, "Online Searches: Characteristics of Users and Uses in One Academic and One Industrial Organization," Proceedings of 1978 Annual ASIS Meeting, November 13-17, New York, New York.

Myers, Leanna, "Online Bibliographic Searching," Florida State University Bulletin, May, 1977.

Selman, Sharon and Marcia J. Myers, "The Use of an Online Bibliographic Search Service by Academic Chemists," submitted to Special Libraries, February, 1979.